ORDER NO. SD83012365C9

Service Manual

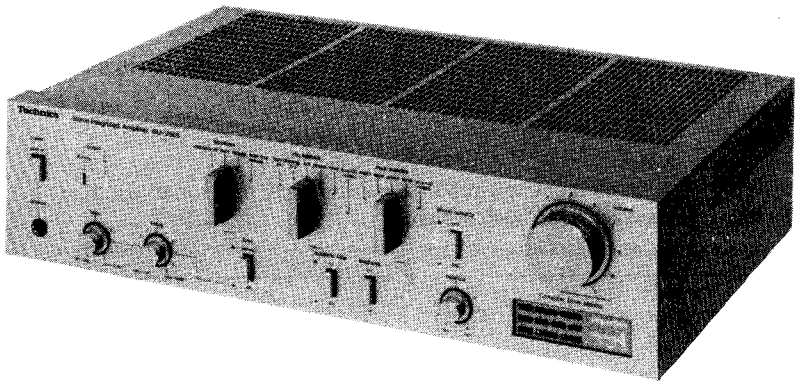
Stereo Integrated Amplifier

SU-V505

[E], [EK], [EF], [EB], [EH], [Ei], [XA], [XL], [PA], [PE], [PC]

SU-V505(K)

[E], [EK], [EB], [EH], [Ei], [XA], [PC]



* The cabinet and front panel are available in black color and silver types.
* The black type model is provided with (K) in the Service Manual.

Areas

* [E] is available in Scandinavia and Switzerland.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [Ei] is available in Italy.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.
* [PA] is available in Far East PX.
* [PE] is available in European Military.
* [PC] is available in European Audio club.

Specifications

(Specifications are subject to change without notice for further improvement.)

(DIN 45 500)

■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output	
both channels driven	2 × 60W (4Ω)
	2 × 60W (8Ω)
40 Hz~16 kHz continuous power output	
both channels driven	2 × 60W (4Ω)
	2 × 60W (8Ω)
1 kHz continuous power output	
both channels driven	2 × 60W (4Ω)
	2 × 60W (8Ω)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.03% (4Ω)
	0.004% (8Ω)
rated power at 40 Hz~16 kHz	0.03% (4Ω)
	0.004% (8Ω)
rated power at 1 kHz	0.007% (4Ω)
	0.003% (8Ω)
half power at 20 Hz~20 kHz	0.004% (8Ω)
half power at 1 kHz	0.002% (8Ω)
−26 dB power at 1 kHz	0.01% (4Ω)
50 mW power at 1 kHz	0.01% (4Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.03%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.01%

Power bandwidth	
both channels driven, −3 dB	
	5 Hz~50 kHz (4Ω, T.H.D. 0.03%)
	5 Hz~60 kHz (8Ω, T.H.D. 0.02%)
Residual hum and noise	0.6 mV
Damping factor	30 (4Ω), 60 (8Ω)
Input sensitivity and impedance	
PHONO MM	2.5 mV/47kΩ
MC	200 μV/220Ω
TUNER, AUX/CD/VIDEO	150 mV/22kΩ
TAPE 1	150 mV/22kΩ
TAPE 2	150 mV/22kΩ
PHONO maximum input voltage (1 kHz, RMS)	
MM	170 mV
MC	15 mV
S/N	
rated power (4Ω)	
PHONO MM	76 dB (83 dB, IHF, A)
MC (250 μV)	64 dB (65 dB, IHF, A)
TUNER, AUX/CD/VIDEO, TAPE	91 dB (IHF, A: 102 dB)
−26 dB power (4Ω)	
PHONO MM	71 dB
MC	63 dB
TUNER, AUX/CD/VIDEO, TAPE	72 dB
50 mW power (4Ω)	
PHONO MM	68 dB
MC	62 dB
TUNER, AUX/CD/VIDEO, TAPE	68 dB

Technics

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Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SU-V505

Frequency response	
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
TUNER, AUX/CD/VIDEO, TAPE	5 Hz~140 kHz (−3 dB) +0 dB, −0.2 dB (20 Hz~20 kHz)
Tone controls	
BASS	50 Hz, +10 dB~ −10 dB
TREBLE	20 kHz, +10 dB~ −10 dB
Subsonic filter	30 Hz, −6 dB/oct.
Loudness control (volume at −30 dB)	50 Hz, +9 dB
Output voltage and impedance	
REC OUT	150 mV
Channel balance, AUX/CD/VIDEO 250 Hz~6,300 Hz	±1 dB
Channel separation, AUX/CD/VIDEO 1 kHz	63 dB
Headphones output level and impedance	520 mV/330Ω
Load impedance	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

■ GENERAL

Power consumption	370W
Power supply	
For continental Europe	(Except for United Kingdom) AC 50 Hz/60 Hz, 220V
For Australia	AC 50 Hz/60 Hz, 240V
For others	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 109 × 290 mm (16-15/16" × 4-9/32" × 11-13/32")
Weight	7.6 kg (16.8 lb.)

Note:
Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

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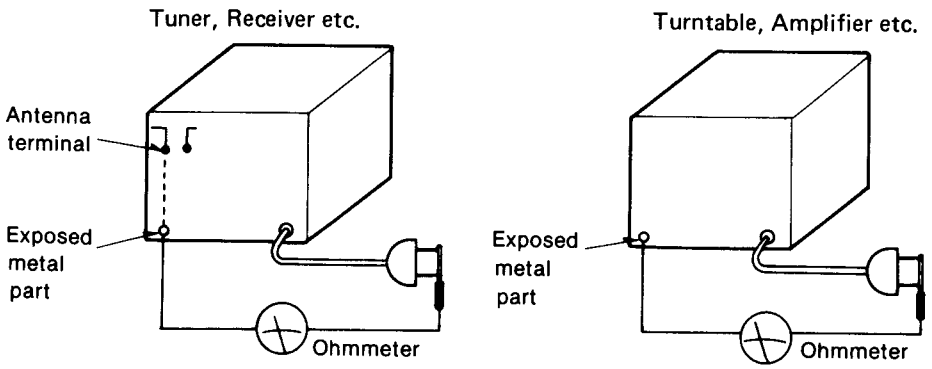
■ SAFETY PRECAUTION

1. Before servicing (such as replacement of components), unplug the power supply cord to prevent an electric shock.
2. Use only manufacturer's recommended components for safety. Check condition of power cord and replace if wear or damage is evident.
3. After servicing, be sure to restore the following to the condition in which they were originally installed.
   (1) the lead dress and
   (2) insulation barriers, insulation papers, shields and the like.
4. Before returning a serviced apparatus to a customer, make the following insulation resistance test to prevent a customer from being exposed to a shock hazard.

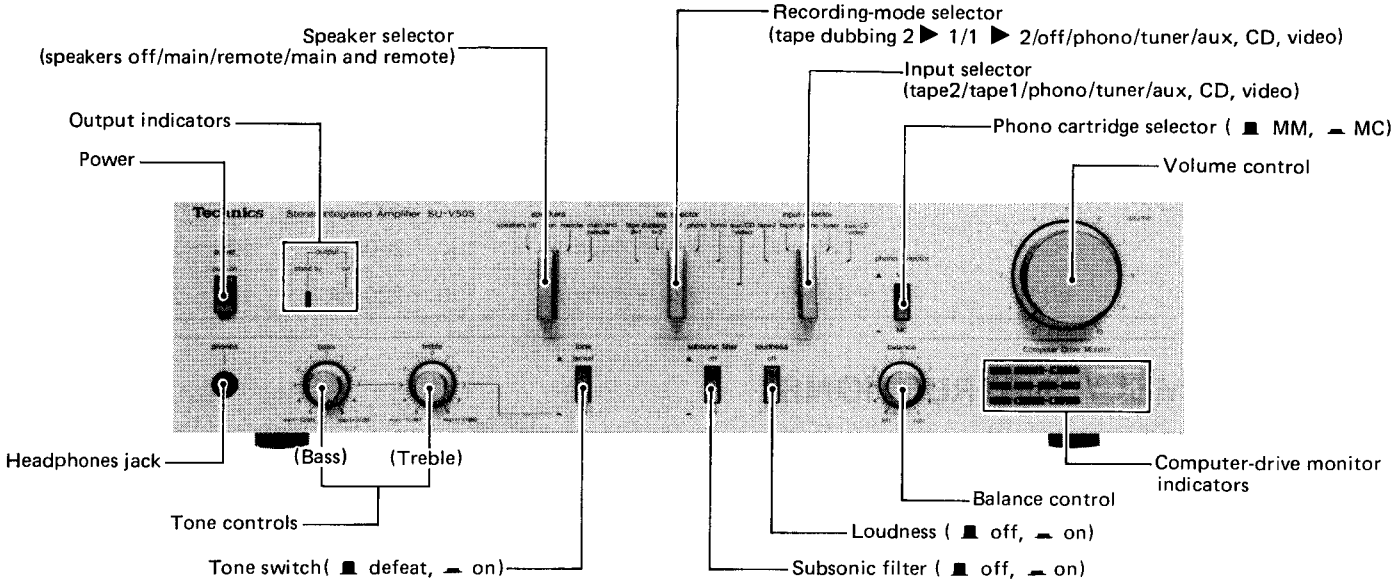
- **Insulation resistance test (See figure below.)**

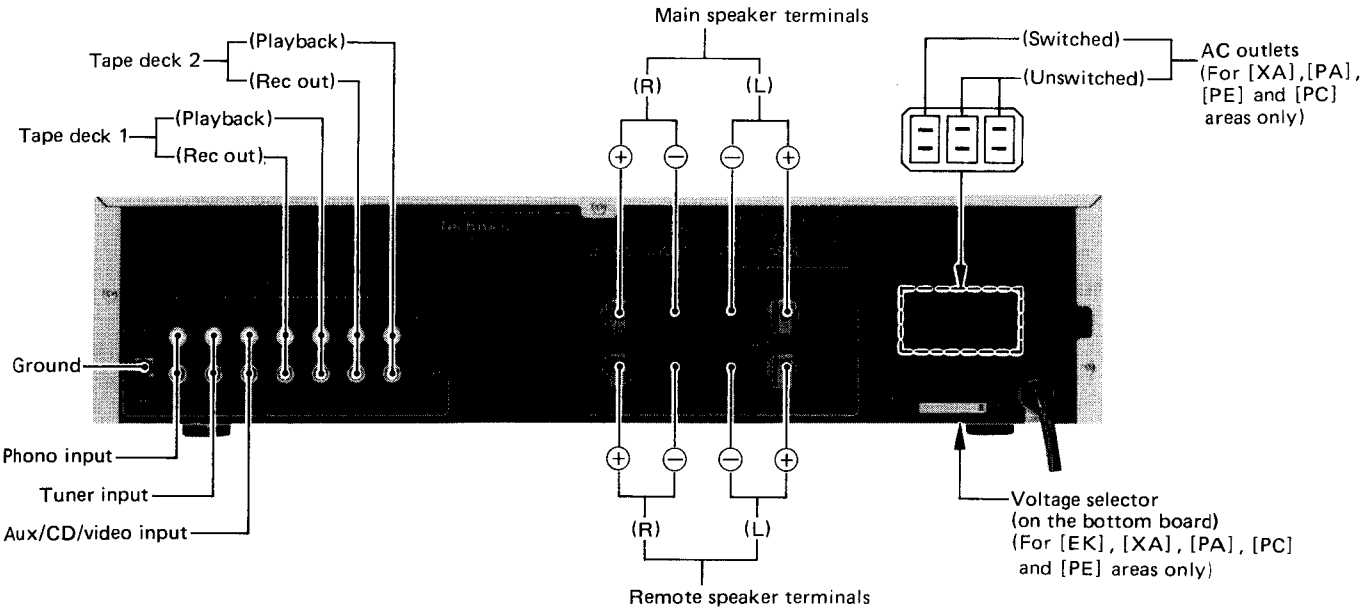
1. Unplug the power supply cord and connect a jumper wire between the two prongs on the plug.
2. Turn on the power switch of the apparatus.
3. Measure the resistance value (with an ohmmeter) between the jumpered AC plug and each exposed metalic cabinet part on the apparatus, such as screwheads, antenna, control shafts, handle brackets, etc.
   The reading should be as shown in figure below. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the apparatus should be repaired and rechecked before it is returned to a customer.



where, R: resistance value

■ LOCATION OF CONTROLS





- The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different. So, refer to the circuit diagram and the replacement parts list.
- * 220V (50/60Hz) for continental Europe. (Except for United Kingdom)
- * 240V (50/60Hz) for Australia.
- * 110V/120V/220V/240V (50/60Hz) for other areas. (for other areas is provided with voltage selector)
- * Phono input capacitance is about 150pF.

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if eigher of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker with an impedance less than the indicated rated impedance of the amplifier are used.

If this occurs, follow the procedure outlined below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again

Note:

When the protection circuitry functions the unit will not operate unless the power is first turned off and then on again.

■ BEFORE REPAIR AND ADJUSTMENT

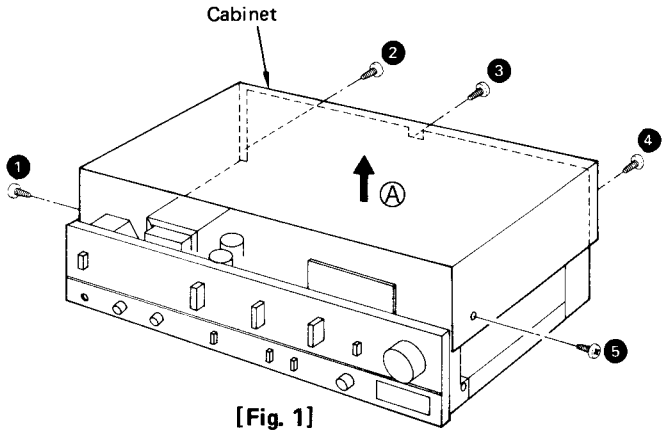
1. Turn off the power supply and short-circuit of power supply capacitors (C401, C402, 8200μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Do not short between C401/402 by screwderiver. It may damage the componet.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current is free of abnormality. The consumed current at 60Hz/50Hz in no signal mode is shown below with respect to supply voltage 110V/120V/220V/240V.

Power supply voltage		AC110V	AC120V	AC220V	AC240V
Consumed current	50 Hz	260 ~ 480mA	240 ~ 440mA	130 ~ 240mA	120 ~ 220mA
	60 Hz	240 ~ 440mA	220 ~ 400mA	120 ~ 220mA	110 ~ 200mA

■ DISASSEMBLY INSTRUCTIONS

• How to remove the cabinet

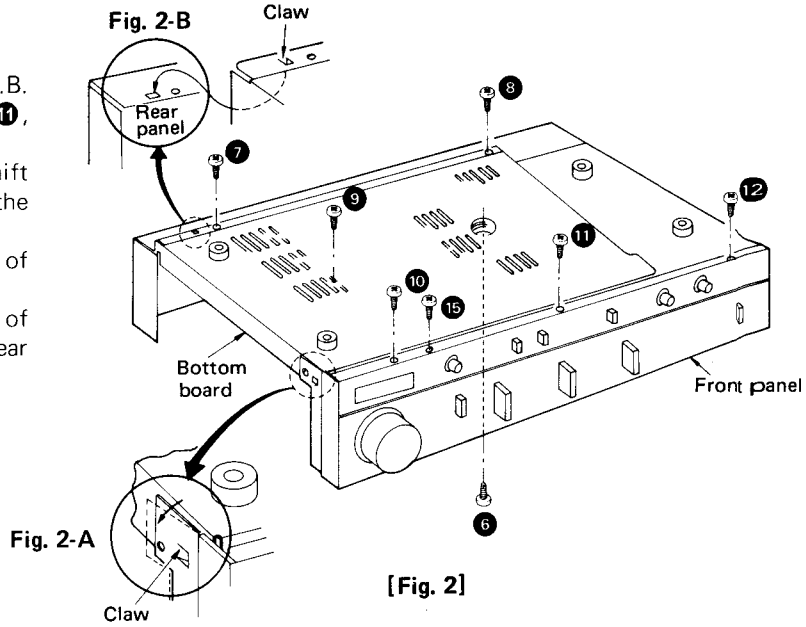
1. Remove the 5 setscrews (Fig. 1: ❶ ~ ❺) of the cabinet.
2. Move the cabinet in the direction of the arrow Ⓐ in Fig. 1.



[Fig. 1]

• How to remove the bottom board

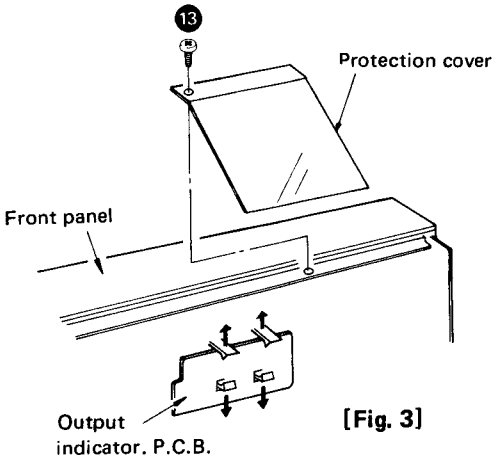
1. Remove the cabinet.
2. Remove the setscrew [Fig. 2: ❻] of the P.C.B.
3. Remove the 6 setscrews [Fig. 2: ❼ ~ ⓫, ⓯] of the bottom board.
4. Raise the rear of the bottom board, and shift the side board a little outward to release the claw from the bottom board. [Fig. 2-A]
5. Remove the bottom board from the bottom of the front panel toward the back of the set.
6. To install the bottom board, fit the claw of the bottom board into the hole in the rear chassis. [Fig. 2-B]



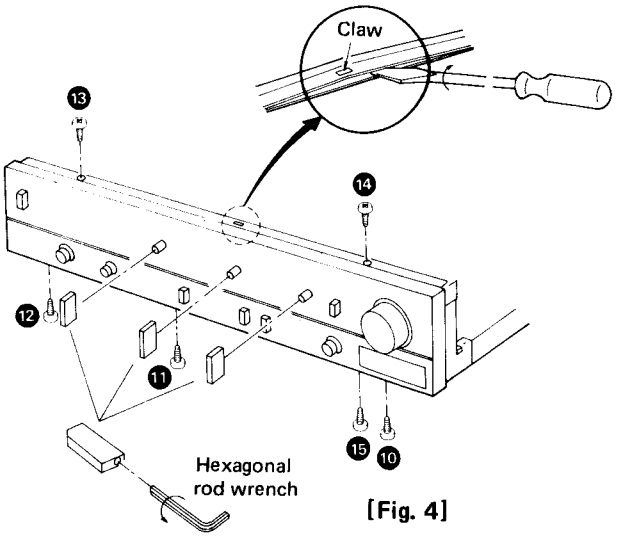
[Fig. 2]

• How to remove the front panel

1. Remove the cabinet.
2. Remove the setscrew [Fig. 3: ⓭] on the left-hand side of the front panel, and then remove the protection cover. (Protection cover is not used in sets for [XA], [PA], [PE].)
3. Push up the upper 2 claws which fasten the output indicator P.C.B., then remove the top of the P.C.B. Next, release the lower 2 claws and remove the P.C.B. (See Fig. 3).
4. Loosen the selector knob screw by hexagonal rod wrench (M3), and pull out the knob.
5. Remove the 5 setscrews [Fig. 4: ⓾ ~ ⓬, ⓮, ⓯] of the front panel.
6. Insert a flat-head screwdriver between the chassis and front panel as in Fig. 4, and then pry open to release the claw from the panel top.
7. Remove the front panel from the chassis.



[Fig. 3]



[Fig. 4]

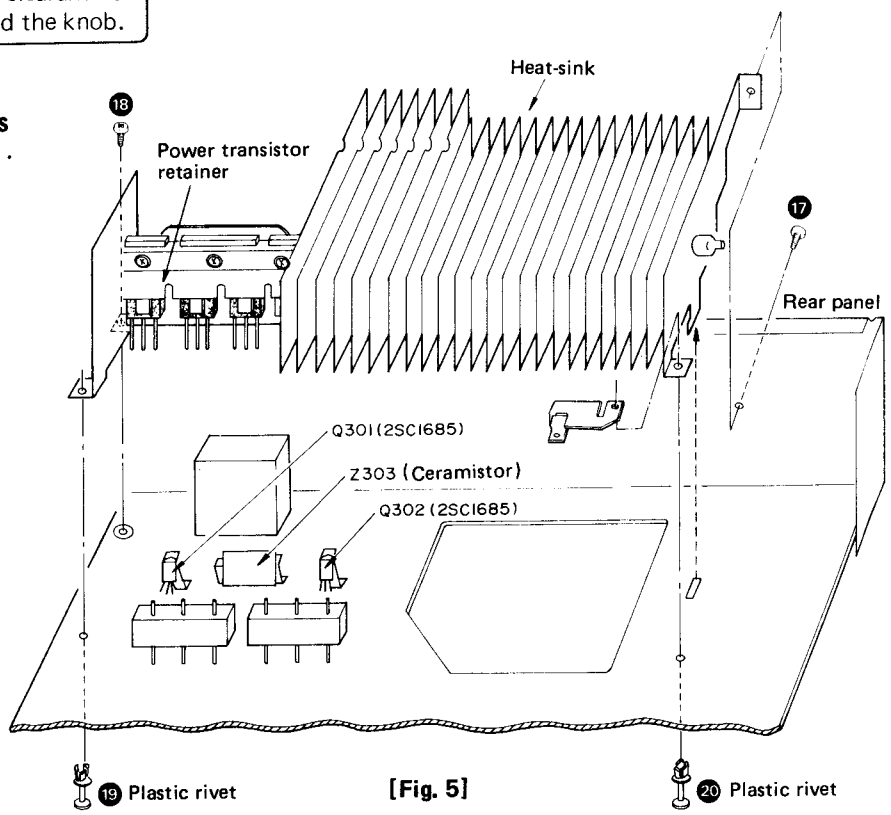
NOTE:
When fitting the selector knob, provide a clearance of about 0.7mm between the front panel and the knob.

• How to remove the power transistors

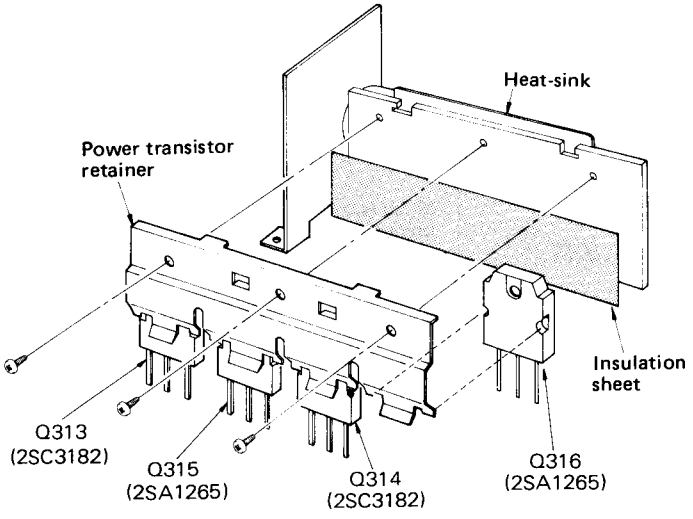
1. Remove the cabinet and the bottom board (Refer to "How to remove the cabinet" and "How to remove the bottom board").
2. Unsolder the power transistors Q313~Q316.
3. Remove the 2 setscrews [Fig. 5: ⑰, ⑱] and 2 plastic rivets [Fig. 5: ⑲, ⑳] which secure the heat-sink.
4. Remove the power transistor retainer to remove the power transistors. (See Fig. 6)

* Precautions for Fitting the Power Transistors

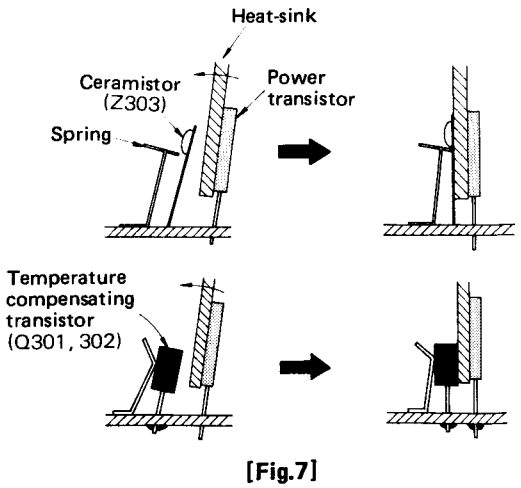
1. Do not apply a heat diffuser or the like to the insulation sheet. [Fig. 6]
2. Make sure that the ceramistor and temperature compensating transistors are in tight contact with the heat-sink. [Fig. 7]
   * Ceramistor: Element whose change in temperature and resistance is positive (proportional).



[Fig. 5]



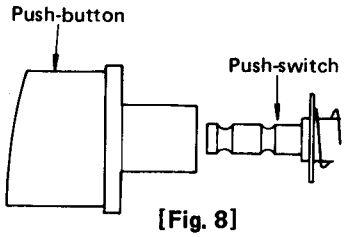
[Fig. 6]



[Fig.7]

*** Precautions for Fitting the Push-buttons**

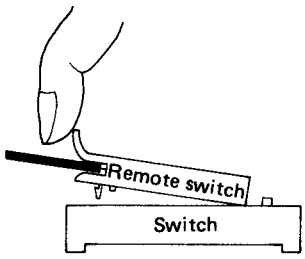
1. When replacing push-button, remove the front panel beforehand.
2. It should be fitted onto the switch with the spherical side down as in Fig. 8.



[Fig. 8]

• How to remove and fit the remote switch

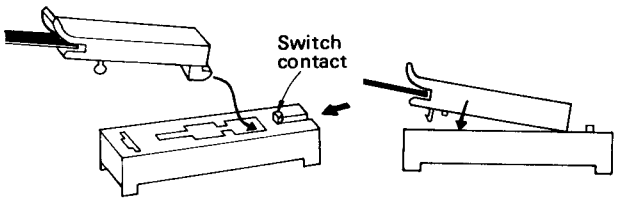
1. How to remove –
Pushing the remote switch, shift it up as in Fig. 9.



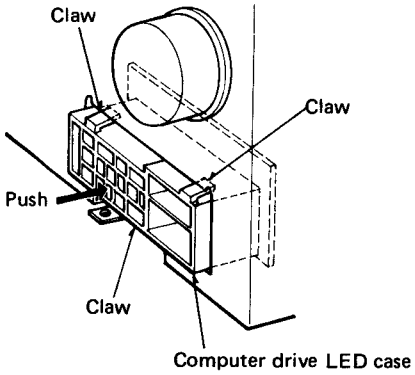
[Fig. 9]

2. How to fit –

(1) Shift the switch contact inside.
(2) Turn the remote switch (selector knob) counterclockwise.
(3) Let the remote switch claw engage with the switch, and shift the remote switch down while pushing it in.



[Fig. 10]



[Fig. 11]

*** How to remove the computer drive LED case**

1. Remove the cabinet and front panel. (Refer to "How to remove the front panel.")
2. Release the 3 claws of computer drive LED case (Fig. 11) to remove the computer drive LED case.
3. When replacing the computer drive LED indicators, unsolder the LED's of D712 ~ 718 and remove them from the printed circuit board along with the computer drive LED case because the case and LED's are set up into an assembly.

■ MEASUREMENTS AND ADJUSTMENTS

1. Clock Adjustment (after replacing the microcomputer)

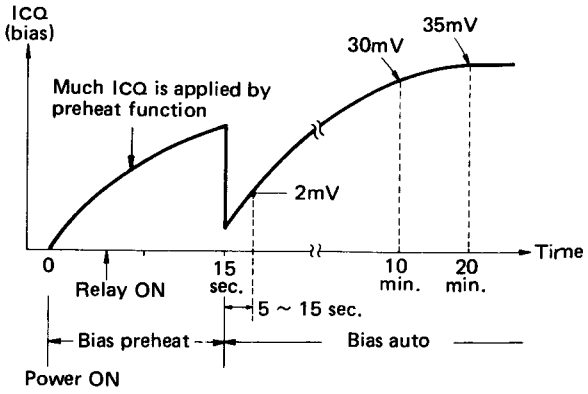
(1) Turn off the power supply.
(2) Adjust VR701 so that the time until the relay turns ON is 5 ~ 7 sec. after power ON.
  * The time elongates with VR701 turned counterclockwise (in the direction of A). (Frequency decreases.)
  * The time shortens with VR701 turned clockwise (in the direction of B). (Frequency increases.)

(Note) Clock frequency of 400 kHz is obtained at TP701. In the case of an ordinary frequency counter and oscilloscope, the frequency cannot be correctly measured because of the probe capacity. So, it is recommended to employ the above-mentioned method during servicing.

2. Idling (ICQ) Adjustment (after reparing the main amp.)

(1) After the repair, set the sound volume to minimum before turning on the power switch, and connect nothing to the speaker terminals.
(2) Completely turn ICQ control (VR301, 302) counter-clockwise.
(3) Increase the voltage applied to the amplifier gradually from 0V by means of a power supply voltage controller, and make sure of the value in the Figure on page 4 before starting the adjustment.
(4) Connect the DC electronic voltmeter to TP303 (+) and TP305 (–) [left channel] or TP304 (+) and TP306 (–) [right channel].
(5) When 5 or 15 seconds have lapsed after computer drive monitor "auto" lights up, adjust VR301 [left channel] or VR302 [right channel] to 2mV.

* In this set, ICQ is controlled by microcomputer, and ICQ a little more than the normal level is applied by "PRE-HEAT" for about 15 sec. after power ON. After that, the output level and transistor temperature are detected by "AUTO", thereby automatically controlling ICQ.

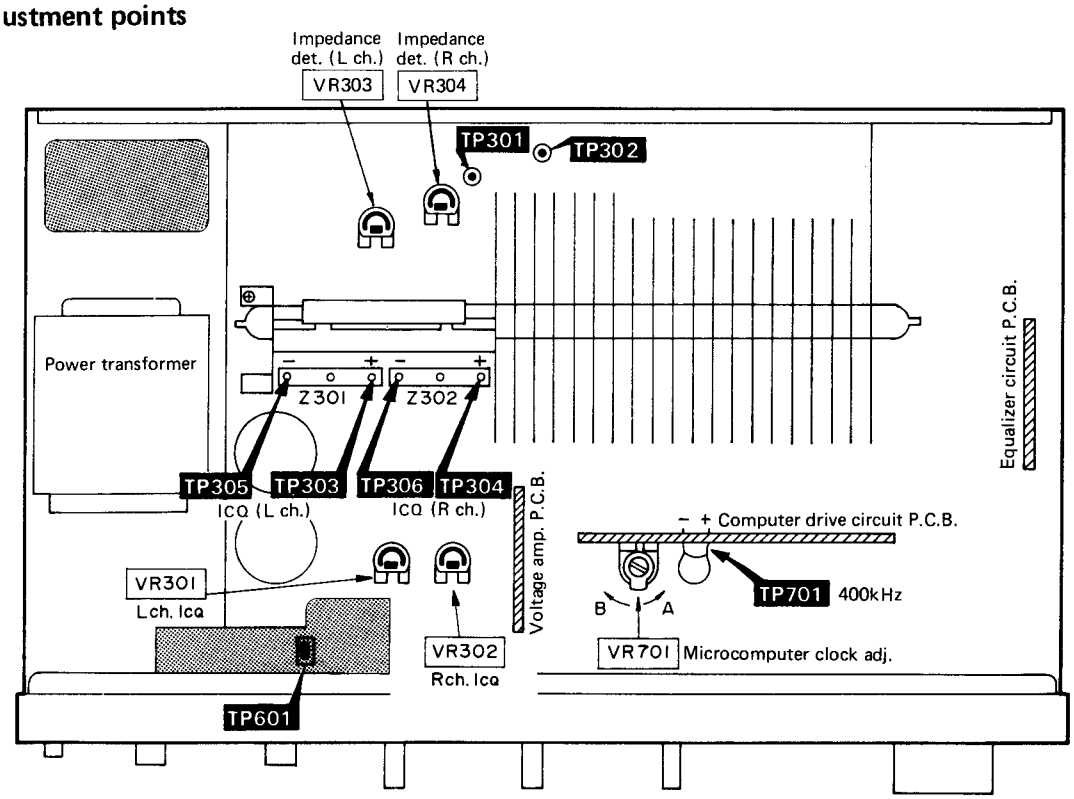


3. Adjustment of Load Impedance Detection Circuit (after reparing the speaker impedance detection circuit).

(1) Connect a load with 6.5Ω (1/2W, carbon, resistor) or series – connected 3.3Ω and 3.3Ω (1/2W, ±5%) to the "main" speaker terminals.
(2) Set the speaker selector to the "main" position.
(3) Connect TP601 and chassis.
(4) Connect a DC voltmeter between TP301 and chassis (Lch.) or TP302 and chassis (Rch.)
(5) Adjust VR303 (Lch.) so that the voltage of TP301 is –200mV.
(6) Adjust VR304 (Rch.) so that the voltage of TP302 is –200mV.

NOTE:
Be sure to adjust VR304 (Rch.) after adjusting VR303 (Lch.).

- **Adjustment points**



* Checks of Protection Circuit After Repair and Adjustment

- **Check of Muting with Power On/Off.**

(1) Connect AC voltmeter and 8Ω load (resistor or speaker) to main speaker terminals.
(2) Set the sound volume to a proper level.
(3) Apply 1 kHz 100 mV signal to AUX. input terminal.
(4) Make sure that output is gained 4 ~ 7 sec. after power switch "on", and that the output goes out immediately after power switch "off".

- **Check of Overload Detection and Protection Circuit**

(1) Apply output signal of about 1.5V at 1kHz to AUX. input terminal.
(2) With main speaker terminals (left channel) short-circuited by lead wire (as thick and short as possible):
Make sure
– relay is off.
– output indicator "on" goes out.
– output indicator "stand by" blinks.
(3) Make sure the state of (2) is gained with output circuit opened. Similarly, check the right channel as well.
* When relay is off, turn power "off" and unit for a while before turning it "on".
Otherwise, the original conditions are not restored even when the circuit and load are normal.

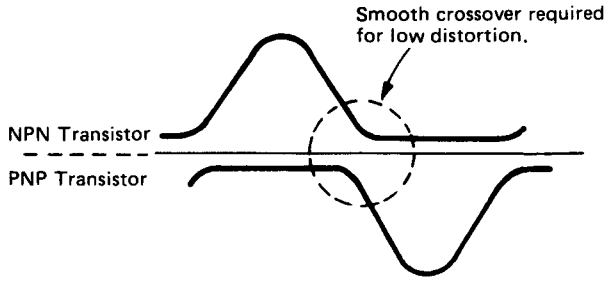
■ TECHNICAL INFORMATION

1. Description of Computer drive system

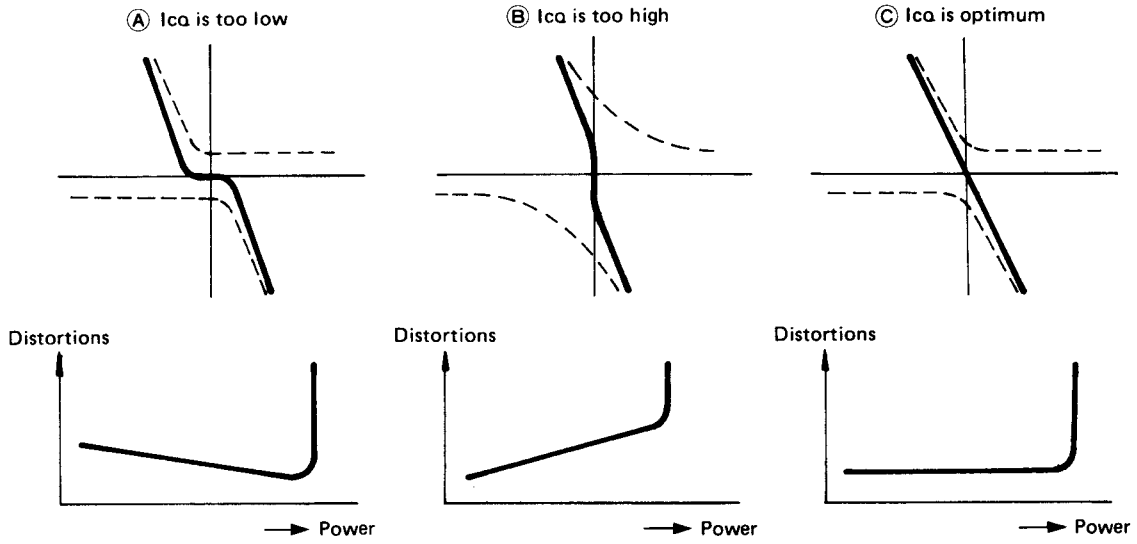
Technics New Class A amplifier circuitry eliminates switching and crossover distortion. To further improve fidelity a "computer drive" circuit has been incorporated to eliminate transient distortion in music signal reproduction.

• Power transistor idling current (Icq)

The idling current through the power transistors is adjusted so that crossover distortion is minimized when switching from the NPN transistor to the PNP transistor in a complimentary design (Fig. 12).
If Icq is not adjusted properly, distortion will result as in Fig. 13.



[Fig. 12]

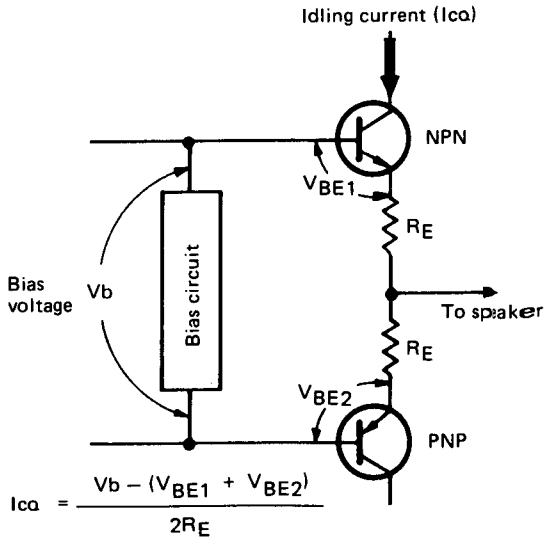


Relationship between idling current level and cross-over distortion.

[Fig. 13]

• Idling current and bias current

Idling current is determined by the bias voltage (Vb) of the bias circuit and the V_{BE} of each power transistor (Fig. 14). The V_{BE} varies according to the temperature of the transistor. This temperature varies instantaneously with the music signal. Unfortunately, with current designs, these instantaneous fluctuations cannot be detected due to the placement of the thermal sensor and the slow temperature change of the heat sink. Attempts have been made to include a thermal sensor as part of the output power pack. However, most power packs do not include a thermal sensor. Also, this method does not work if discrete components are used. We are still faced with the problem of stable bias operation and fast response to abrupt changes in temperature.

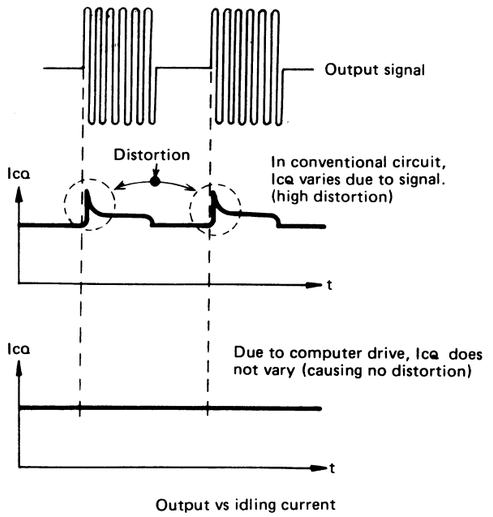


[Fig. 14]

• Computer drive system

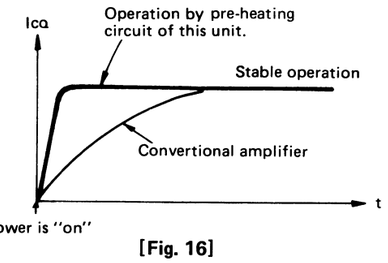
Knowing the thermal and signal characteristics of the power transistors, a system can be designed to calculate the instantaneous temperature changes and adjust for the optimum idling current. Information regarding the transistor ambient temperature and the input music signal is obtained through sensors and fed to a computer. The computer calculates the optimum idle current and maintains it at a constant level by varying the bias voltage. Figure 15 illustrates the relationship of the output signal and the idling current. Figure 17 is a block diagram of the "computer drive" system.

Generally, it takes several minutes for the power transistors to reach the temperature of stable operation after the power is turned on. To ensure stable and optimum performance quickly, the microcomputer forces a large amount of idling current through the power transistors for a short time. This rapidly "preheats" the transistors and the heat sink. Figure 16 illustrates the stable operation level for the convertional and new computer drive system.

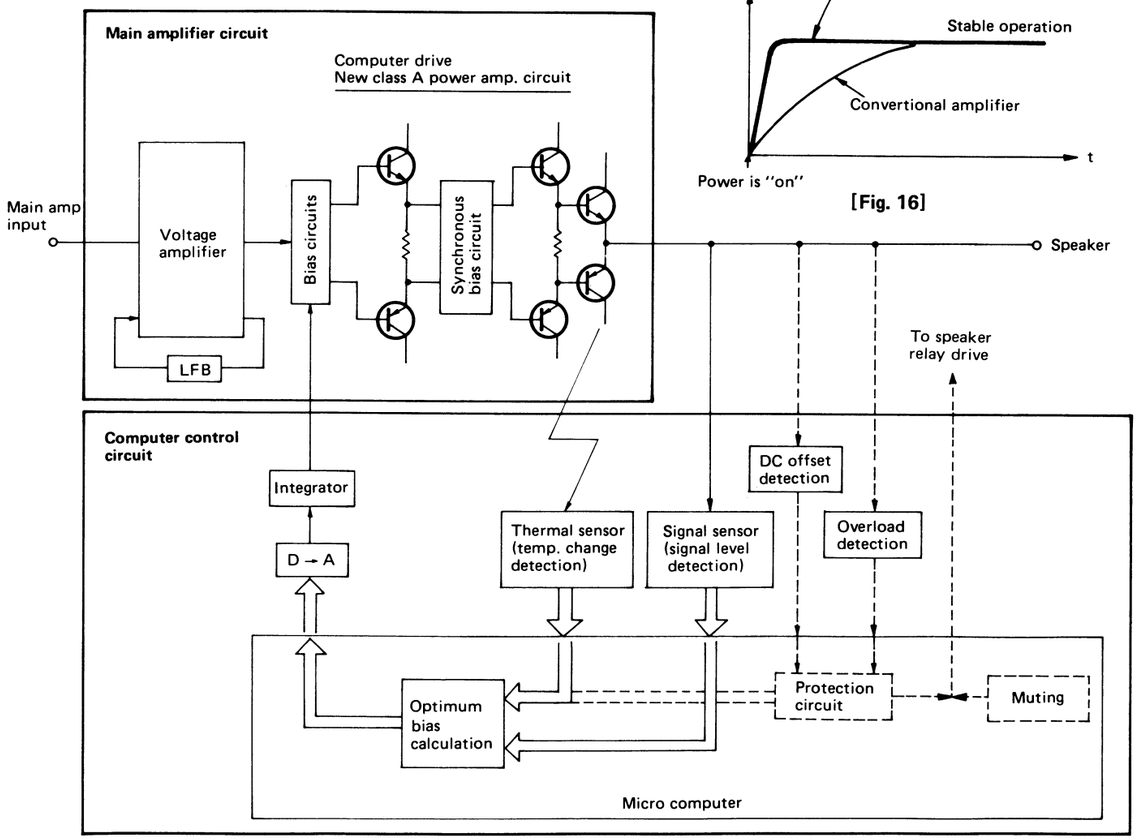


Output vs idling current

[Fig. 15]



[Fig. 16]



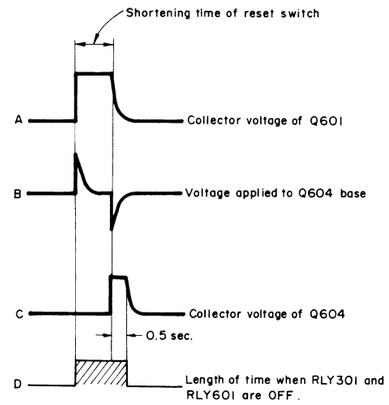
[Fig. 17]

2. Description of Speaker Impedance Detection Circuit

This circuit serves to detect the impedance of speaker connected to the speaker terminals and to change the secondary tap voltage of power transformer according to the speaker impedance. It consists of a voltage comparing circuit, reset circuit, detection signal generating circuit, and speaker select relay drive circuit.

1) Reset circuit and detection signal generating circuit

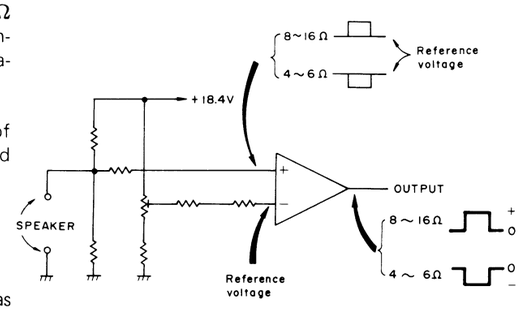
The reset switch of speaker select switch is short-circuited only when the switch is shifted, With the speaker select switch shifted, the reset switch is short-circuited, then Q601 of reset circuit turns ON. When Q601 turns ON, positive voltage as in Fig. 18-A is generated at the collector of Q601, causing Q602 to turn ON.
When Q602 turns ON, Q321 turns OFF, and so does RLY301.
Also, when Q321 turns OFF, the collector potential of Q321 becomes positive, causing Q605 to turn OFF.
Then RLY601 also turns OFF (high volt tap).
When the reset switch is open, a voltage as in Fig. 18-B is applied to the base of Q604 due to the charge and discharge of C601.
With Q604 turned ON, a voltage as in Fig. 18-C is generated at the collector of Q604. The voltage causes Q602 to turn ON.
When Q602 turns ON, RLY301 turns OFF and so does RLY601 (high volt tap). That is, both RLY301 and RLY601 are OFF during short-circuit of reset switch and for 0.5sec. more after opening the switch.
Also, when power switch is turned ON, C604 is charged with voltage, then the base voltage of Q601 becomes 0V and Q601 turns ON. Then both RLY301 and RLY601 turn OFF, and the speaker impedance detecting circuit operate. About 0.5sec. after power switch ON, C604 is discharged and Q601 turns OFF.



[Fig. 18]

2) Voltage comparing circuit

IC301 is a voltage comparing circuit. With RLY301 turned OFF, the speaker is connected to the voltage comparing circuit. (Fig. 19) The reference voltage is applied to minus terminals (②, ⑥) of IC301.
Also, plus terminals (③, ⑤) of IC301 are subject to change according to the impedance of the speaker connected to the set.
The adjustment has been made with VR303 and VR304 so that the output voltage of IC301 is 0V with 6.5Ω speaker connected. If the impedance of the speaker connected is 4Ω, the output voltage of IC301 becomes negative, causing Q605 to turn ON.
Then RLY601 also turns ON (low volt tap).
If the speaker impedance is 8Ω, the output voltage of IC301 becomes positive, then Q605 turns OFF and RLY601 also turns OFF (high volt tap).



[Fig. 19]

3) Voltage comparing circuit and reset circuit

The operation amplifier of voltage comparing circuit has a nature to hold the impedance 8Ω, or 4Ω once detected. So, if a speaker with different impedance is connected, it is necessary to turn OFF the power supply or shift the speaker select switch before operating the reset circuit.

Output signal

ntional circuit,
s due to signal.
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uter drive, Ico does
sing no distortion)

re-heating
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Stable operation

al amplifier

t

Speaker

speaker
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Muting

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When Q602 turns ON, Q321 turns OFF, and so does RLY301.

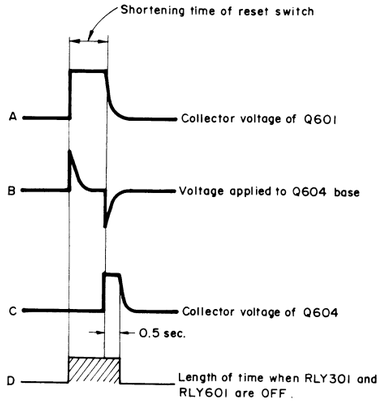
Also, when Q321 turns OFF, the collector potential of Q321 becomes positive, causing Q605 to turn OFF. Then RLY601 also turns OFF (high volt tap).

When the reset switch is open, a voltage as in Fig. 18-B is applied to the base of Q604 due to the charge and discharge of C601.

With Q604 turned ON, a voltage as in Fig. 18-C is generated at the collector of Q604. The voltage causes Q602 to turn ON.

When Q602 turns ON, RLY301 turns OFF and so does RLY601 (high volt tap). That is, both RLY301 and RLY601 are OFF during short-circuit of reset switch and for 0.5sec. more after opening the switch.

Also, when power switch is turned ON, C604 is charged with voltage, then the base voltage of Q601 becomes 0V and Q601 turns ON. Then both RLY301 and RLY601 turn OFF, and the speaker impedance detecting circuit operate. About 0.5sec. after power switch ON, C604 is discharged and Q601 turns OFF.



[Fig. 18]

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Also, plus terminals (③, ⑤) of IC301 are subject to change according to the impedance of the speaker connected to the set.

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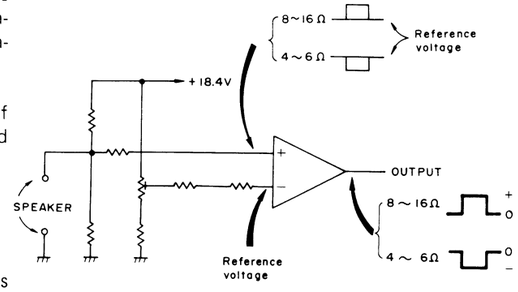
Then RLY601 also turns ON (low volt tap).

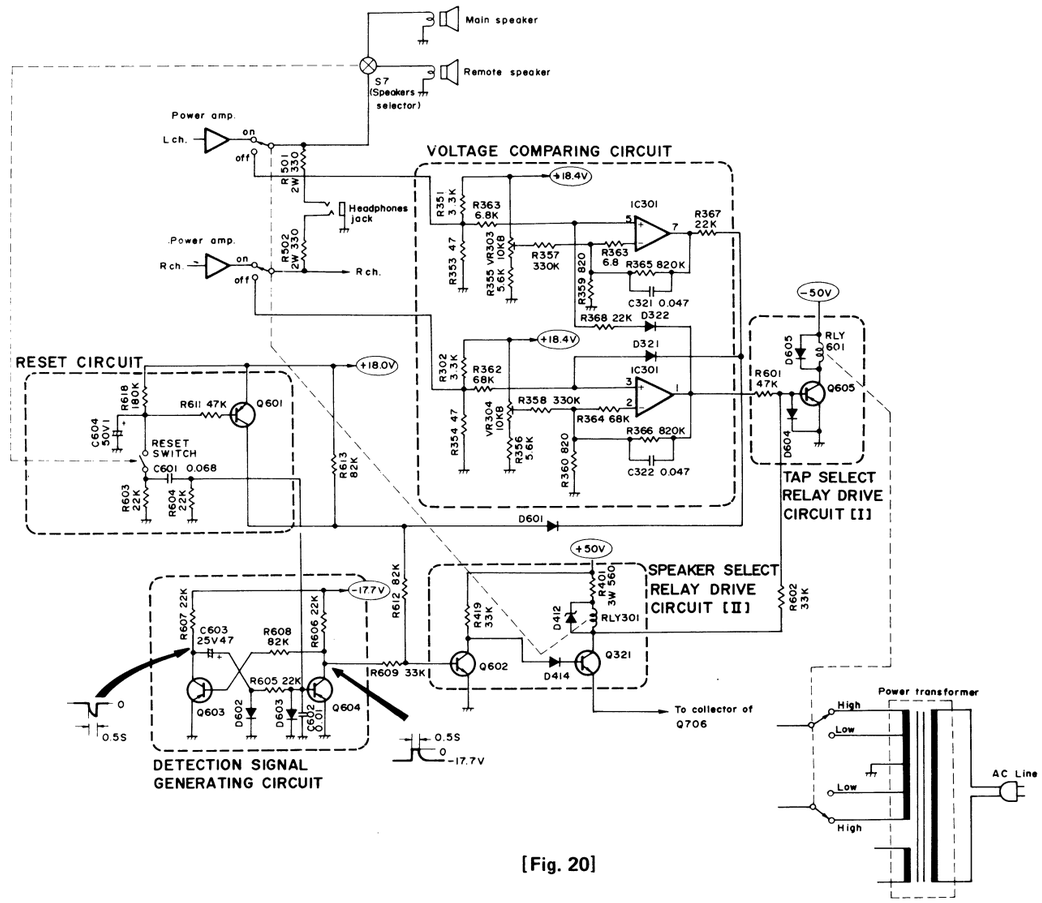
If the speaker impedance is 8Ω, the output voltage of IC301 becomes positive, then Q605 turns OFF and RLY601 also turns OFF (high volt tap).



[Fig. 19]

3) Voltage comparing circuit and reset circuit

The operation amplifier of voltage comparing circuit has a nature to hold the impedance 8Ω, or 4Ω once detected. So, if a speaker with different impedance is connected, it is necessary to turn OFF the power supply or shift the speaker select switch before operating the reset circuit.

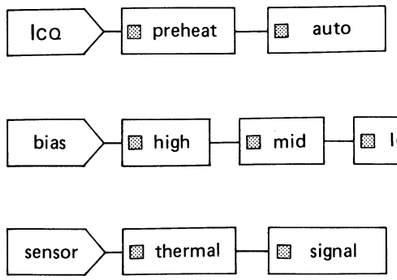


[Fig. 20]

■ OPERATION OF ICQ CONTROLLER

- **Computer drive monitor indicators**

These indicators are used to check that stable idling current flows from the bias circuit in order to prevent transient crossover distortion.



ICQ:
When the power is switched on, the radiator is preheated so that the bias circuit can immediately operate. The "preheat" indicator will illuminate at this time, and then, when the circuit is fully stabilized, the "auto" indicator will illuminate.

bias:
When the power is switched on, the bias changes from high, mid and low during the time until the idling current becomes stabilized, and the respective indicators illuminate.
Note that the display will no longer illuminate when the idling current has reached a condition of stability.

sensor:
The "thermal" sensor detects the temperature of the output transistor(s) and radiator, and the "signal" sensor detects the music signal level. Both indicators will illuminate when the sound can be heard.

- **Output indicators**

These indicators show the condition of the signal sent to speakers or headphones.
When the power switch is switched on, the "stand by" indicator flashes, and, when the unit is operating normally, the "on" indicator will illuminate.
Note that the "stand by" indicator will flash if the positive and negative speaker terminals or speaker connection cords are short-circuited, or if some other circuit abnormality which causes the protection circuit to function is detected. If this occurs, switch the power switch off, and then on again after first determining the cause of the problem and correcting it.

- **ON-time of each indicator, and output generated at pin terminal of microcomputer (IC702)**

▒▒ "ON" (light up) time

Output port	(4) pin CO_7	(3) pin CO_8	(2) pin CO_9	(15) pin EO_0	(16) pin EO_1	(17) pin EO_2	(18) pin EO_3	(26) pin DO_3	(23) pin DO_0
Ind. / sec.	bias low	bias mid	bias high	sensor thermal	sensor signal	ICQ auto	output stand by	output on	ICQ preheat
Power "ON"	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ	Ⓛ
0.4 sec.									
0.8 sec.	Ⓗ	Ⓗ				Ⓗ	Ⓗ		
0.4 sec.							Ⓛ		
0.4 sec.							Ⓗ		
0.4 sec.							Ⓛ		
0.4 sec.		Ⓛ	Ⓗ		Ⓗ		Ⓗ		
0.4 sec.							Ⓛ		
0.4 sec.							Ⓗ		
0.4 sec.				Ⓗ	Ⓛ		Ⓛ		
0.4 sec.							Ⓗ		
0.4 sec.							Ⓛ		
0.4 sec.	Ⓛ	Ⓗ					Ⓗ		
0.4 sec.							Ⓛ		
0.4 sec.							Ⓗ		
14 sec.	Ⓗ		Ⓛ	Ⓛ	Ⓛ			Relay ON	
⎫						Ⓛ		Ⓗ	Ⓗ

6 sec.

* 130°C (266°F) sensor is for protection of circuit. ICQ is not controlled.

[Fig. 21]

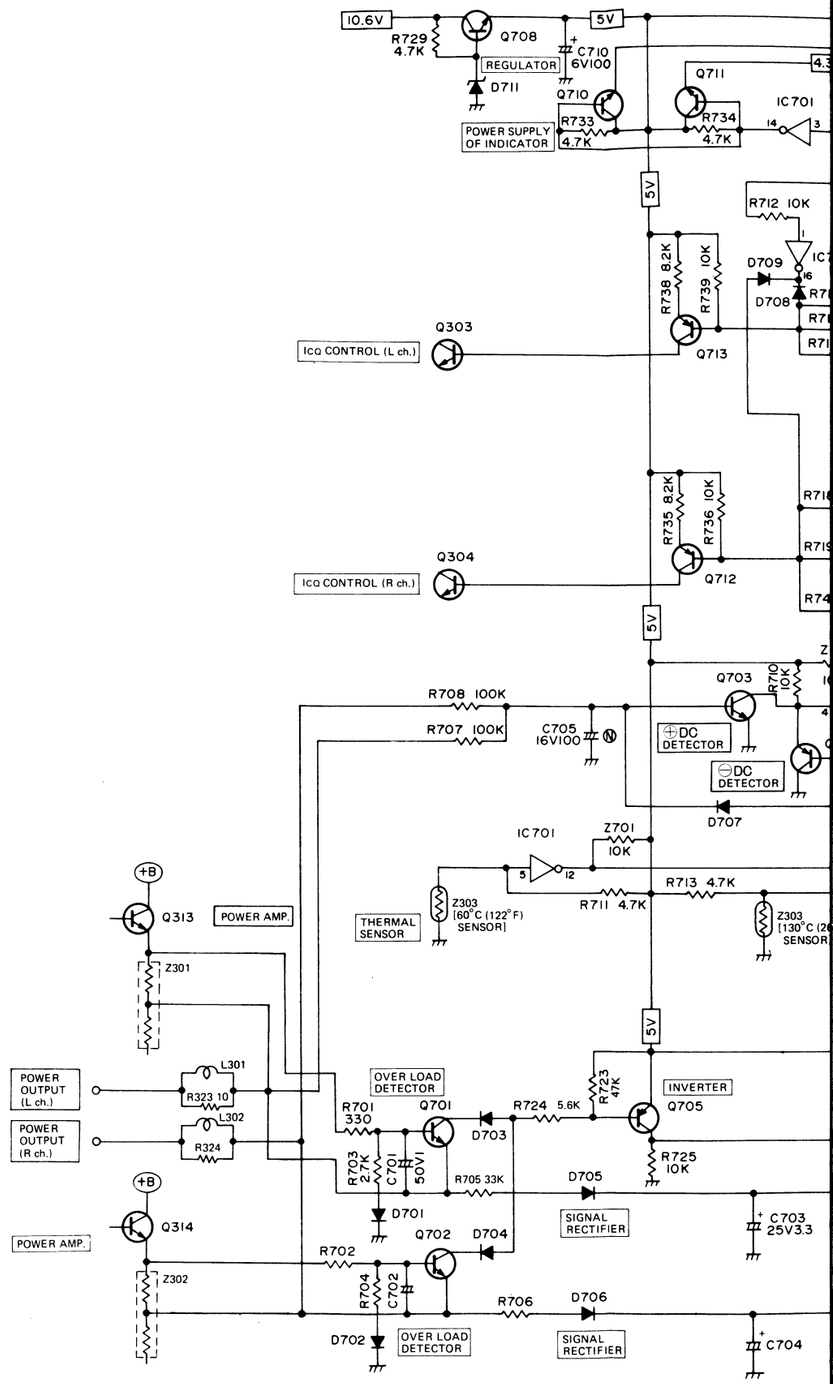
1) Preheat
When power supply is turned ON, the level of IC702 pin ㉓ becomes low. At the same time, preheat LED (D717) lights up, Q707 turns OFF and so does the computer drive lamp. Also, Q709 turns ON, then voltage is applied to LED's (D712), (D713), (D714). Each of D712, D713 and D714 is controlled by IC702 terminals ② , ③ and ④ respectively. The output voltages are shown in Fig. 21. The "high" LED lights up first, followed by "mid" LED, and then "low" LED. IC702 Pin ⑰ turns power supply ON as in Fig. 21. It becomes "H" 0.4 sec. later, then IC701 pin ① also becomes "H". IC701 pin ⑯ changes to "L" and it is applied to Q712 and Q713 through D708 and D709, causing Q712 and Q713 to turn ON. IC701 pin ⑯ delivers a large ICQ for 6 sec. after power ON (while pin ⑯ is "L"), and after that, pin ⑯ become "H". ICQ is controlled by the output of IC702 pin ②, ③, ④.

2) Signal sensor and thermal sensor
The musical signal from power amplifier is applied to IC702 pin ⑪ (pin ⑬) through D705 (D706) and IC701. When the signal. changed to DC by D705 (D706) and C703 (C704), becomes higher than about 2V, then "L" input is applied to IC702 pin ⑪ (pin ⑬), and the output is delivered to IC702 pin ② , ③, ④ . Also, when the temperature of heat-sink becomes higher than 130°C the resistance of the thermistor (Z303) increases and IC701 pin ⑤ becomes "H". IC701 pin ⑫ changes to "L", then "L" input is applied to IC702 pin ⑩ . The output is delivered to IC702 pin ⑪ , ⑬ (signal sensor input) and IC702 pin ⑩ (thermal sensor input), thereby controlling ICQ through R715, 716, 717 and Q712, 713.

3) Power on/off muting
When power supply is turned ON, the output of IC702 pin ㉖ is "L" for about 6 sec. as in Fig. 21, then relay RLY301 turns OFF, and D710 output "on" LED also turns OFF. The voltage of IC702 pin ⑱ alternately becomes "L" and "H" for 6 sec. after power ON as in Fig. 21, causing D719 "stand by" LED to blink. IC702 pin ㉖ output becomes "H" 6 sec. after power ON, then relay RLY301 turns ON and D710 output "on" LED lights up.
When power supply is turned OFF, "H" is applied to IC701 pin ② and IC701 pin ⑮ output changes to "L" because the time constant of C410 (3.3μF) and R414 (15kΩ) is smaller than that of C401 (8200μF) and R411 (100kΩ). The signal is put into IC702 pin ⑳ while "L" output is delivered to IC702 pin ㉖ . When pin ㉖ becomes "L", Q706 turns OFF and so does relay RLY301.

4) DC detection circuit
When the power amplifier voltage is over 2V DC. Q703 (⊕DC detection) and Q704 (⊖DC detection) are turned ON, then "H" input is applied to IC702 pin ⑦ , and "L" output is delivered to IC702 pin ㉖ . When pin ㉖ becomes "L", relay RLY301 turns OFF the same as in power-off muting.

5) Overload detector circuit
When speaker terminals are short-circuited, a large amount of current flows into Z301 (Z302), and the base voltage of Q701 (Q702) increases, causing Q701 (Q702 and Q705 to turn ON. As Q705 turns ON, "H" input is applied to IC702 pin ㉒ , and "L" output is delivered to IC702 pin ㉖ . When pin ㉖ becomes "L", relay RLY301 turns OFF the same as in power off muting.
When "H" is applied to IC701 pin ㉒ , the output of IC702 pin ㉖ is held. Therefore, turn off the power switch and check the set beforehand. Otherwise, relay RLY301 will not turn ON.



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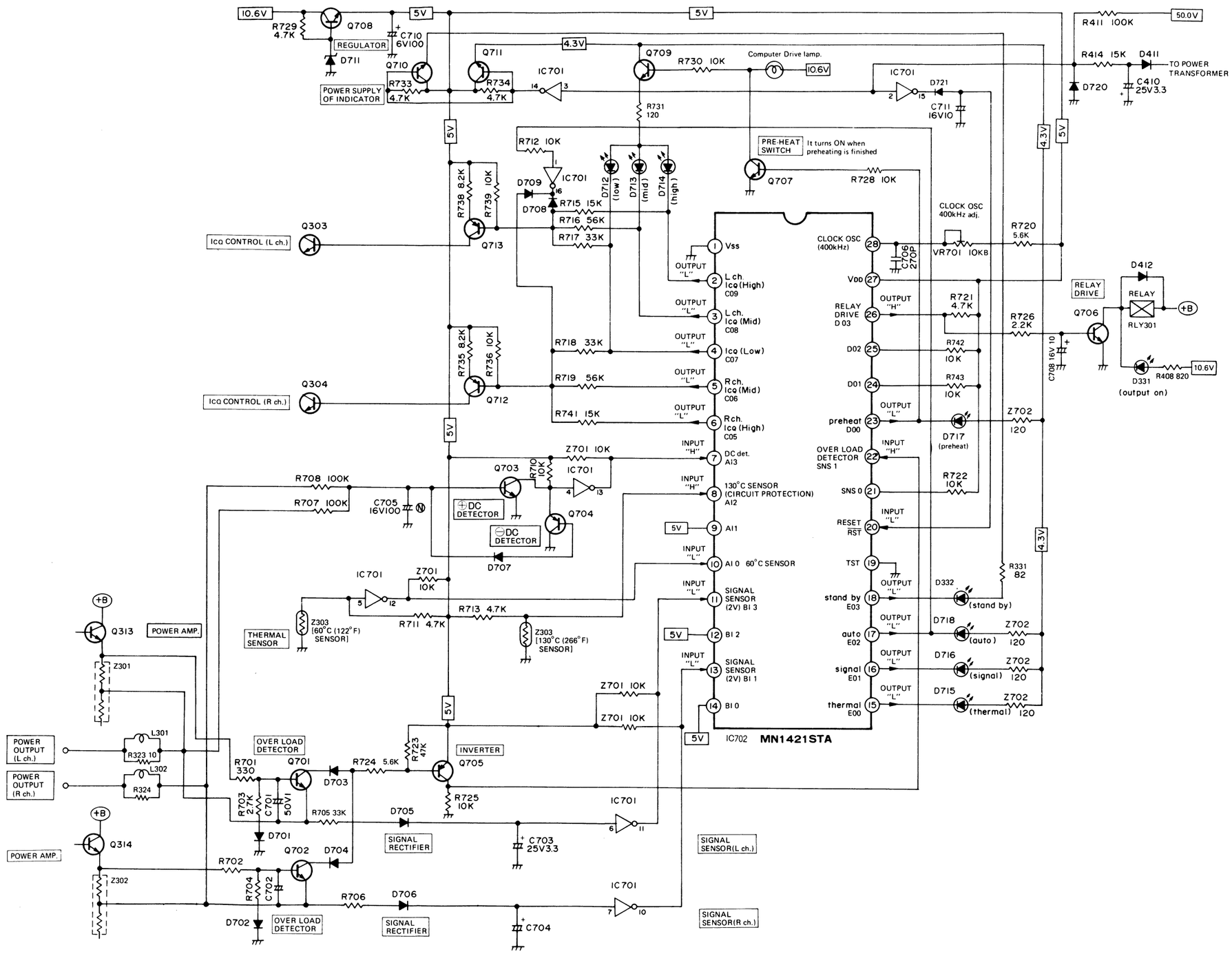
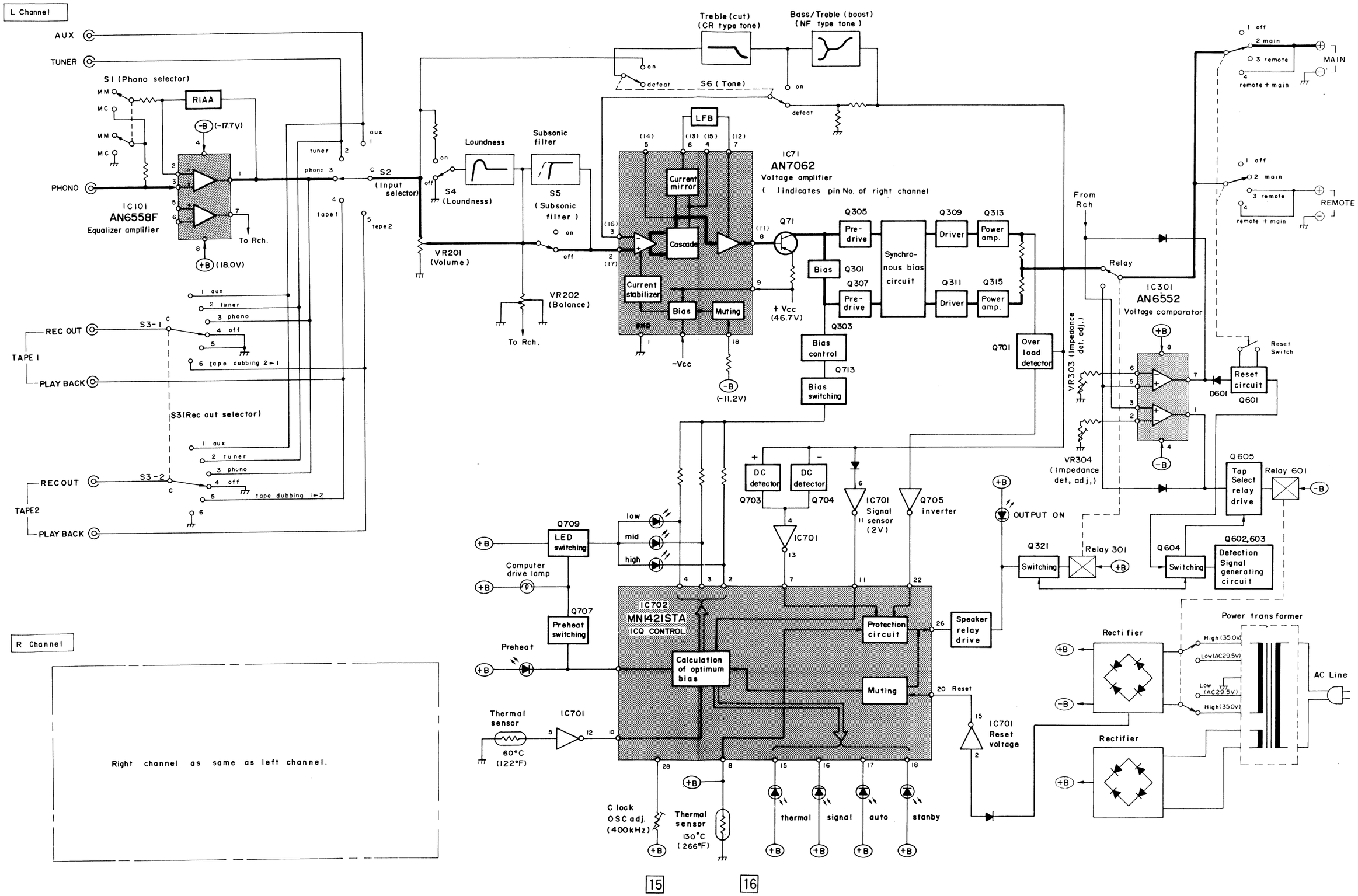
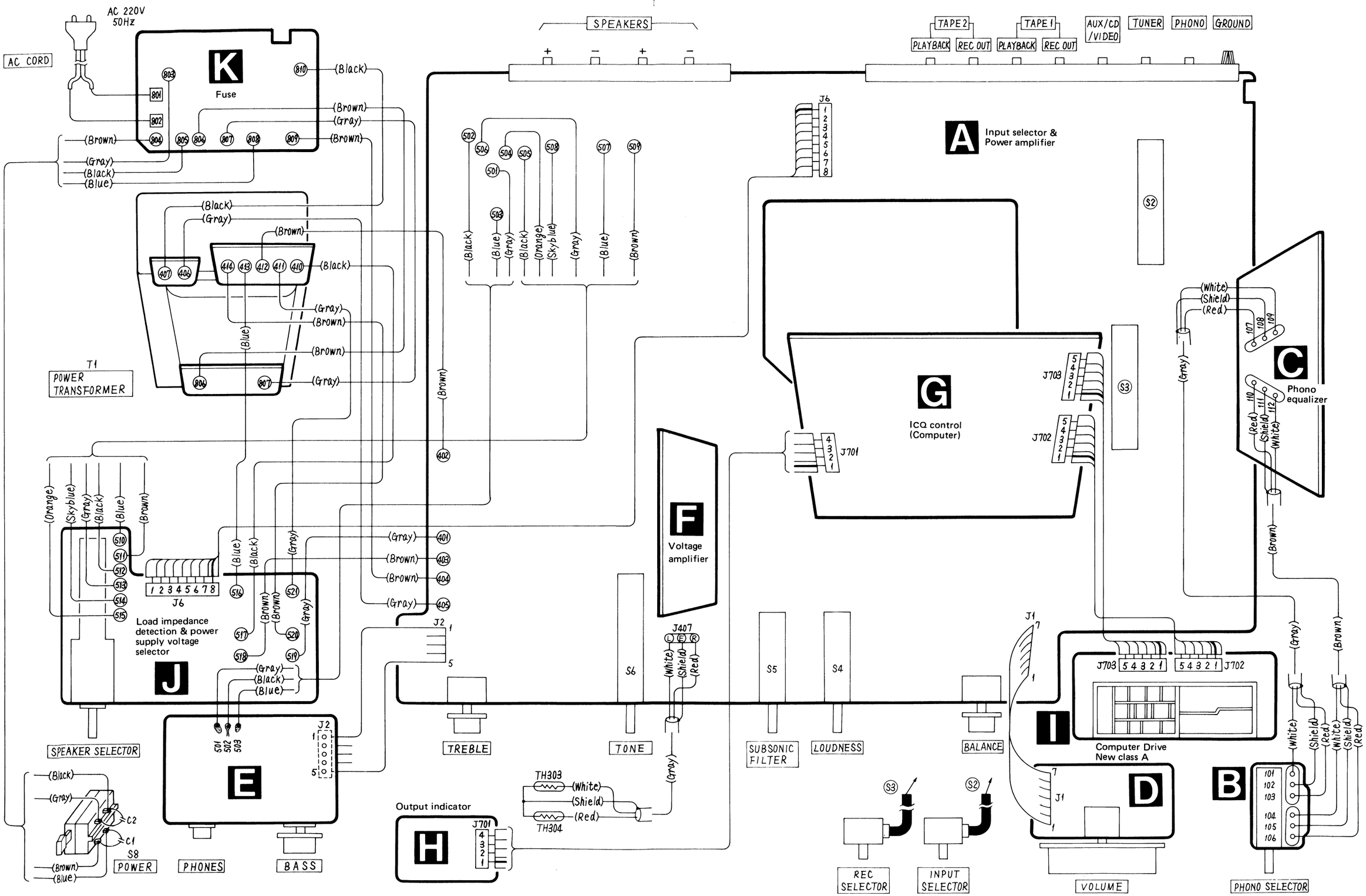


■ BLOCK DIAGRAM

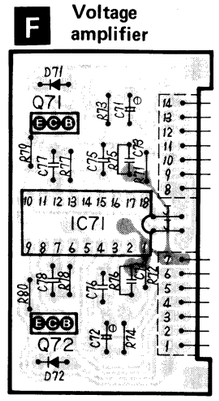


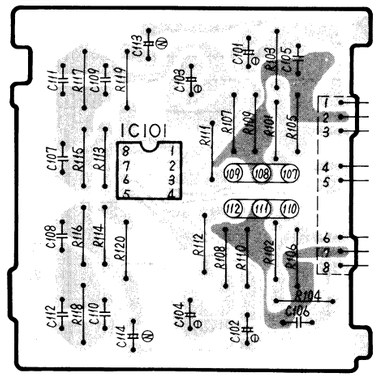
■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Top View)

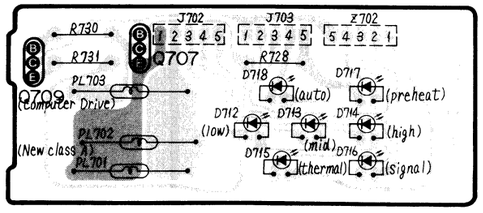


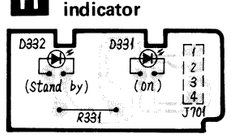
■ PRINTED CIRCUIT BOARDS

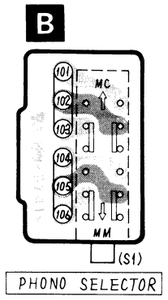
Ground (Earth) lines

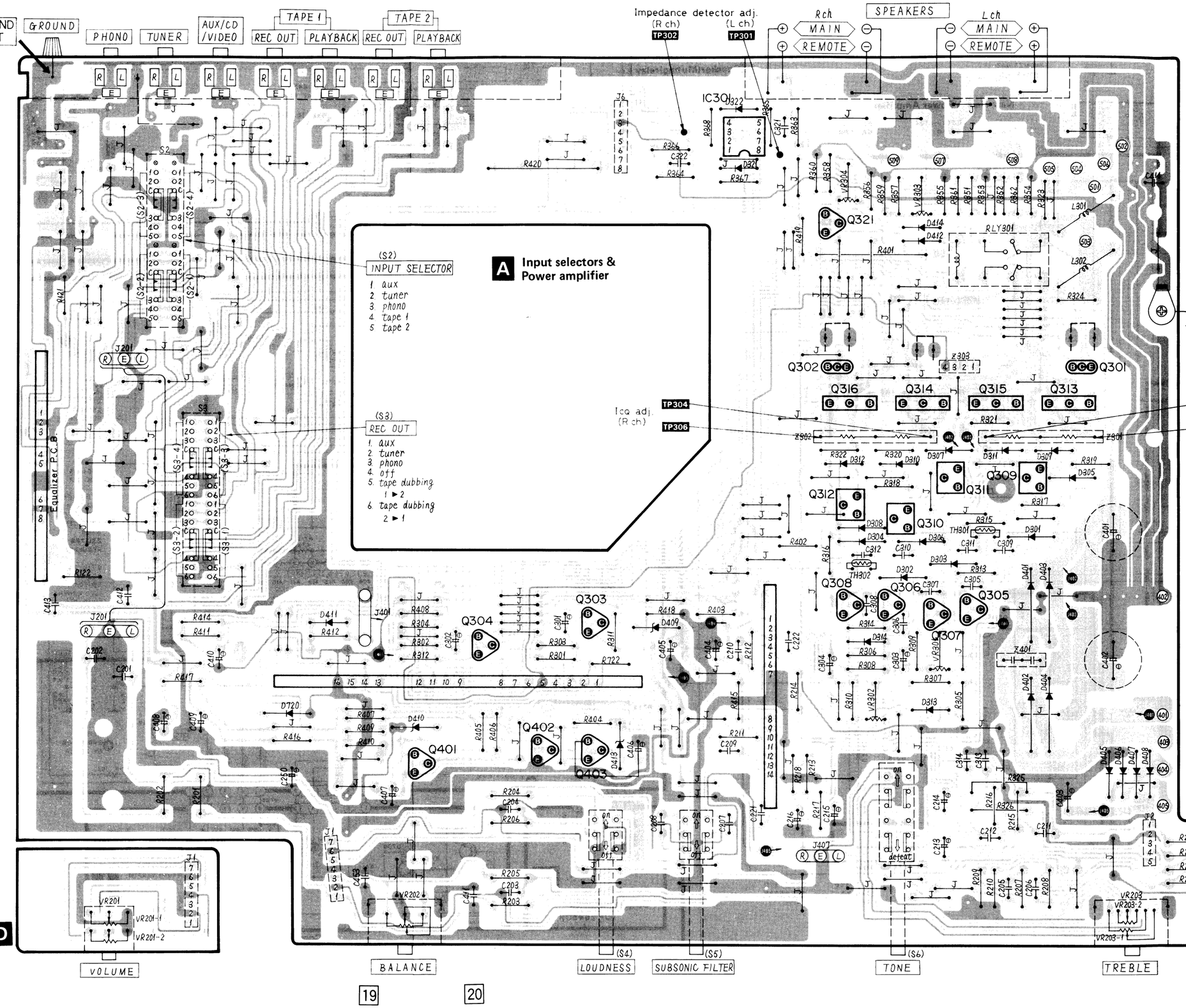


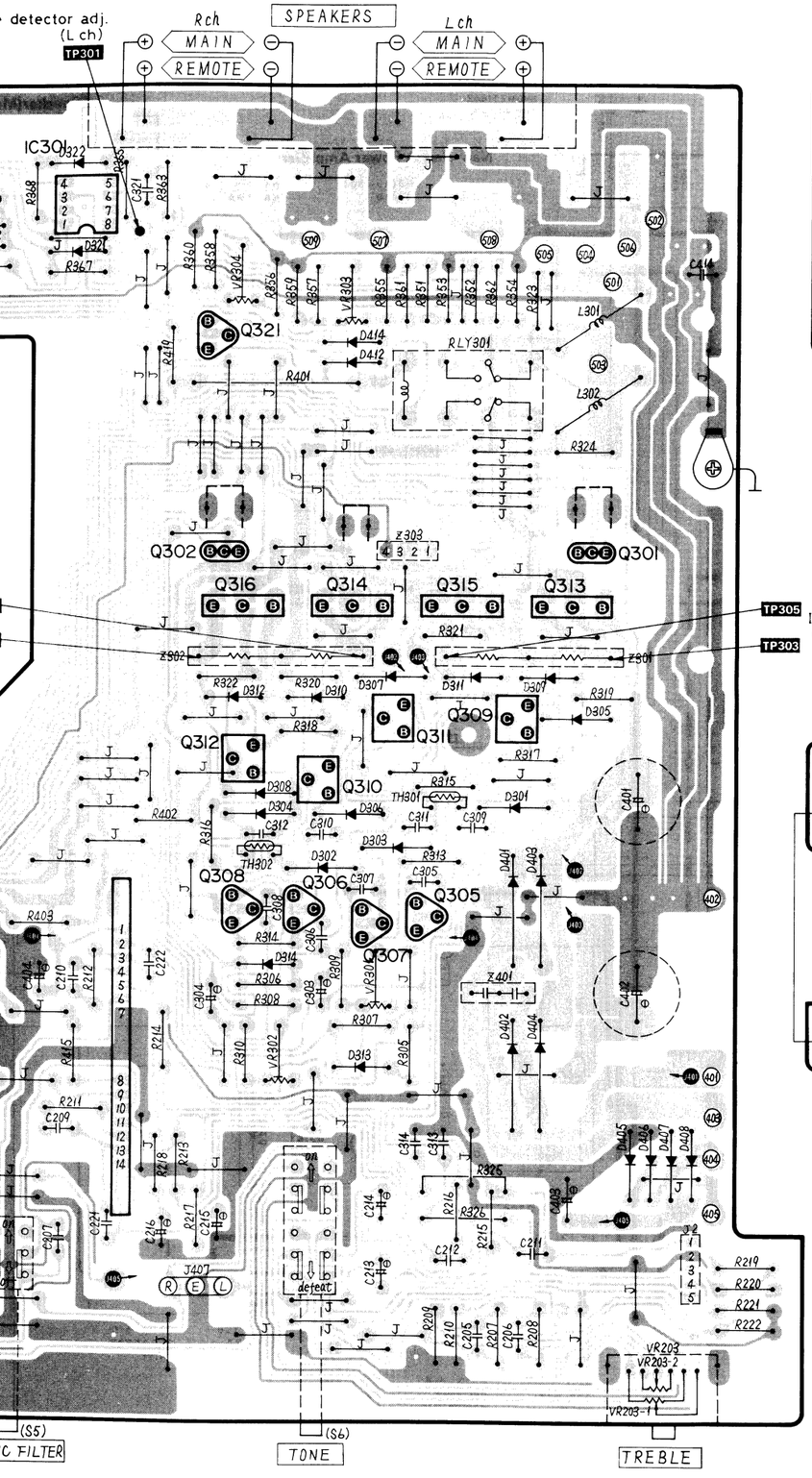


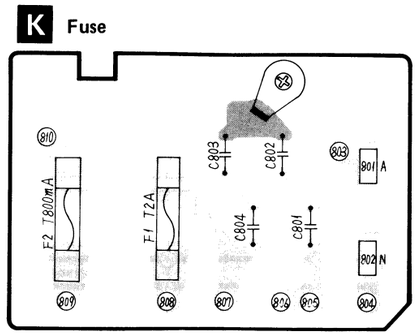


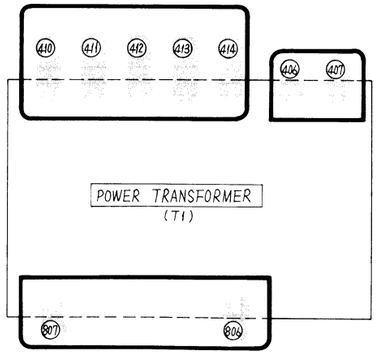


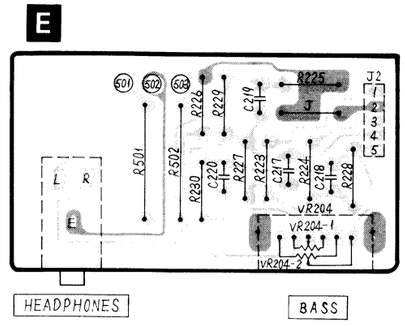


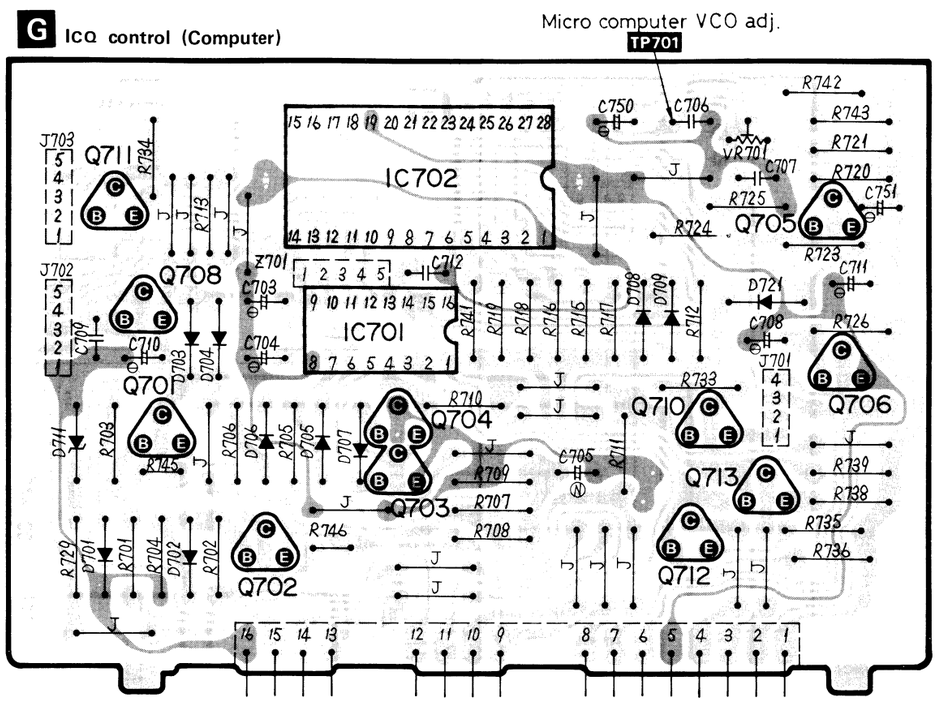


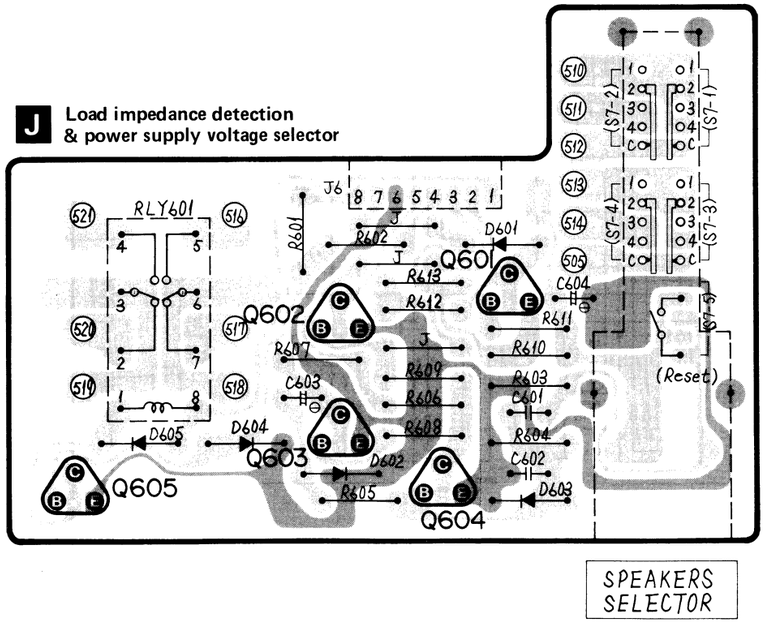

detector adj. (L ch)
TP301
Rch
SPEAKERS
Lch
MAIN
REMOTE
MAIN
REMOTE
IC301
Q321
RLY301
L301
L302
Q302
Q301
Z303
Q316
Q314
Q315
Q313
TP305
TP303
Icq adj. (L ch)
Z302
Z301
Q309
Q311
Q312
Q310
Q308
Q306
Q305
Q307
Z401
J407
R L
defeat
(S5)
TONE
(S6)
TREBLE



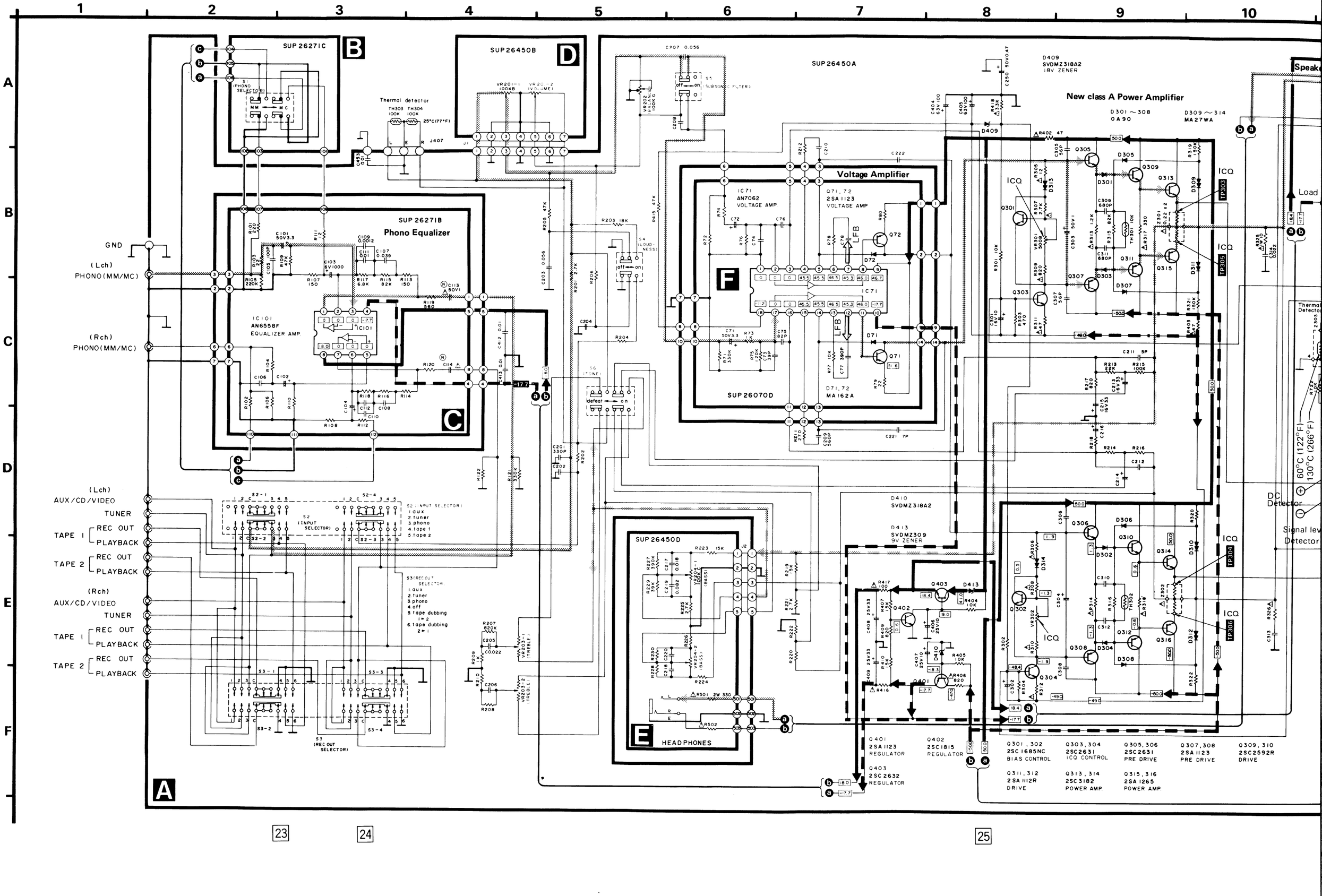








■ SCHEMATIC DIAGRAM



23 24 25

8 9 10 11 12 13 15 16 17 18

New class A Power Amplifier

D301 ~ 308 0A90

D309 ~ 314 MA27WA

D409 SVDMZ318A2 18V ZENER

Speaker(Muting)relay

Load impedance detection

Q321 2SC1845 RELAY DRIVE

D321,322,412,414 MA150

IC301 AN6552 VOLTAGE COMPARATOR

Relay Drive

Speakers L MAIN R SPEAKERS L REMOTE R

ICQ

ICQ Control, Muting & Protection

ICQ Control

SUP26271A

Inverter

IC701 SVITD6250IP INVERTER

D721 MA150

Relay Drive

Q706 2SC3112 RELAY DRIVE
Q701,702 2SC1845 SIGNAL LEVEL DET
Q703 2SC1815 ⊕DC DET
Q704,705 2SA1015 ⊖DC DET/ INVERTER
Q708 2SD788 REGULATOR
Q710,711 2SC3112 SWITCHING (LED POWER)
Q712,713 2SA992 SWITCHING (ICQ CONTROL)

D401 ~ 404 SVDS3V20 RECT

D405 ~ 408 SVDSR1K2 RECT

D411 MA150

D720 0A90

Thermal Detector

60°C (122°F)
130°C (266°F)

DC Detector

Signal level Detector

IC702 MN1421STA ICQ CONTROLLER

Clock 400kHz 2.8V 0.7V

D701 ~ 704 MA162A

D705 ~ 709 MA150

D711 SVDMZ306 6V ZENER

D331 LN820WP

D332 LN420WP

Output indicator SUP26450H

Q707 2SC3112 SWITCHING (PREHEAT)
D712 ~ 717 SVDAY5533IM

Q709 2SD661 SWITCHING (LED)

D718 SVDBG5533K-1

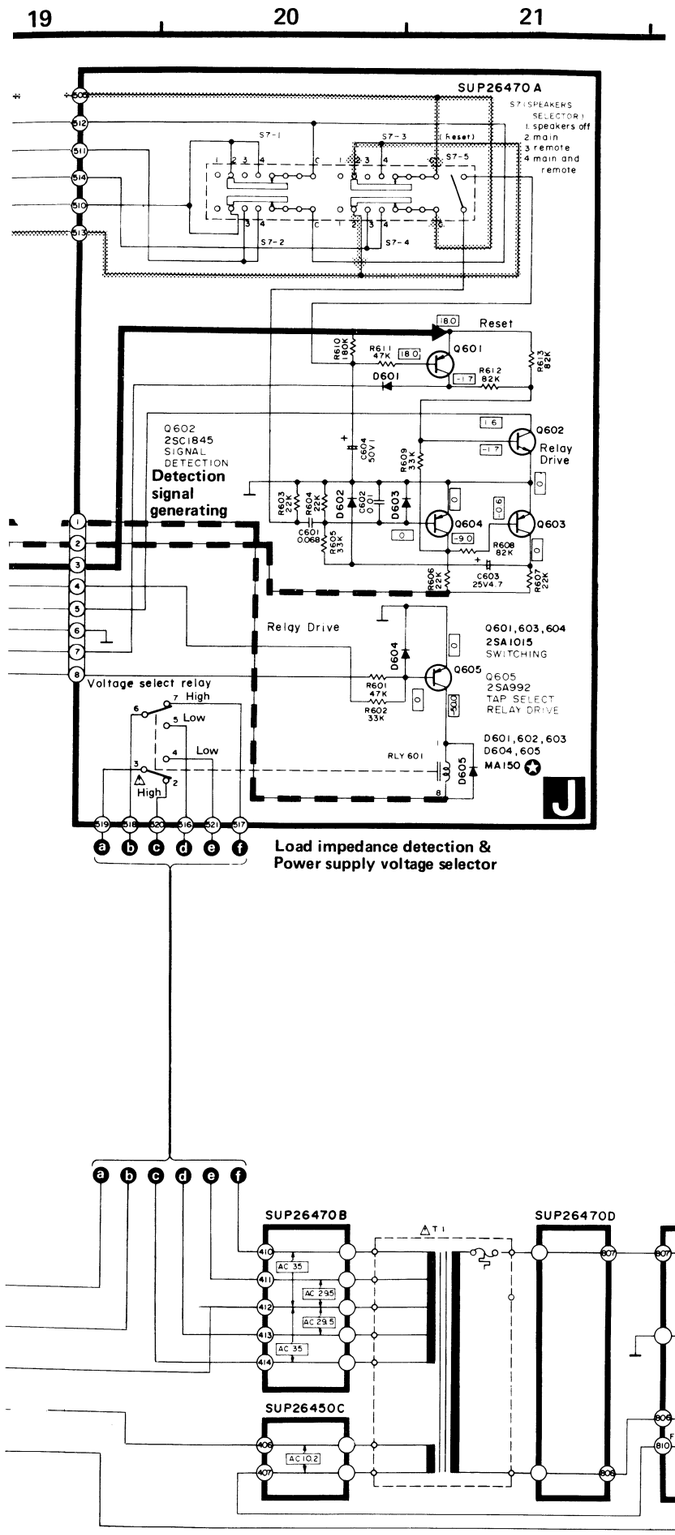
(Computer Drive) (New class A) lamp 12V 55mA

SUP26271E

Computer Drive monitor

Q402 2SC1815 REGULATOR

Q301, 302 2SC1685NC BIAS CONTROL
Q303, 304 2SC2631 ICQ CONTROL
Q305, 306 2SC2631 PRE DRIVE
Q307, 308 2SA1123 PRE DRIVE
Q309, 310 2SC2592R DRIVE
Q311, 312 2SA1112R DRIVE
Q313, 314 2SC3182 POWER AMP
Q315, 316 2SA1265 POWER AMP



(This shcematic diagram may be modified at any time with the development of new technology.)

- **The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement parts, please use the part No. in the replacement parts list.**
- This is the basic circuit diagram (For continental Europe) of this unit. Note that part of the circuit is subject to change depending on the areas.
- Regarding the circuits to be changed in the basic circuit diagram (For continental Europe) and related areas (EF), (EB), (Ei), (EK), (XL), (XA), (PA) and (PE) refer to the separate service manual (Order No. SD83012365C9–A)

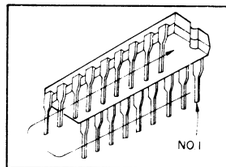
Notes:

1. **S1** : Phono cartridge selector switch in **"MM"** position. MM ↔ MC
2. **S2-1 ~ S2-4** : Input selector switch in **"phono"** position. 1. aux ↔ 2. tuner ↔ 3. phono ↔ 4. tape 1 ↔ 5. tape 2
3. **S3-1 ~ S3-4** : Recording-mode selector switch in "**off**" position. 1. aux ↔ 2. tuner ↔ 3. phono ↔ 4. off ↔ 5. tape dubbing 1▶2 ↔ 6. tape dubbing 2 ▶1
4. **S4** : Loudness switch in "**off**" position.
5. **S5** : Subsonic filter switch in "**off**" position. on ↔ off
6. **S6** : Tone switch in "**defeat**" position. defeat ↔ on
7. **S7** : Speaker selector switch in "**main**" position. Speakers off ↔ main ↔ remote ↔ main and remote
8. **S8** : Power source switch in "**on**" position.
9. **S9[XA, PA, PE, EK] only** : Voltge selector switch in "**240V**" position 120V ↔ 110V ↔ 220V ↔ 240V
10. The headphone jack switch is being short-circuited. (With the headphone plug not inserted)
11. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
12. ▭ indicated voltage values are the standard values for the DC electronic circuit tester (high impedance) with the ground point taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester. (high tap)
13. Phono signal lines
14. Positive (+B) voltage lines
15. Negative (–B) voltage lines

■ FUNCTION OF TERMINAL (Ico CONTROLLER IC702)

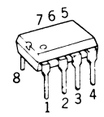
Pin No.	Mark	Name of block	Description of terminal
1	Vss	Power supply input terminal	Grounded (0V)
2	CO_9	Output port C	It delivers Ico control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	CO_8		
4	CO_7		
5	CO_6		
6	CO_5		
7	AI_3	Input port A	When DC detection circuit of power amplifier operates, the input level becomes "H".
8	AI_2		When 130°C (266°F) sensor of power amplifier operates, the input level becomes "H".
9	AI_1		Not used in this unit
10	AI_0		When 60°C (122°F) sensor of power amplifier operates, the input level becomes "L".
11	BI_3	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates. (L ch.)
12	BI_2		Not used in this unit
13	BI_1		Input level changes to "L" as effective output 2V signal sensor of power amplifier operates (R ch.)
14	BI_0		Not used in this unit.
15	EO_0	Output port E	Indicator "thermal" lights up at "L" output.
16	EO_1		Indicator "signal" lights up at "L" output.
17	EO_2		Indicator "auto" lights up at "L" output.
18	EO_3		Indicator "stand by" lights up at "L" output.
19	TST	Test input terminal	Terminal for testing LSI (Grounded)
20	RST	Reset input terminal	All outputs are cleared or reset with input at "L". (It is connected to power supply circuit)
21	SNS_0	Sensor input terminal	Conditional transfer (branach) is performed according to the input level.
22	SNS_1		Input level changes to "H" as power amplifier output short-circuit operates.
23	DO_0	Output port D	Output terminal for indicator "preheat" and preheating circuit operation. [Output "L"]
24	DO_1		Not used in this unit.
25	DO_2		
26	DO_3		Output relay turns ON with output at "H"
27	VDD	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

• Terminal guide of transistors, diodes and IC's

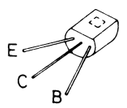


AN7062	18pin
AN6558F	8pin
SVITD62501P	16pin
MN1421STA	28pin

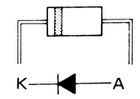
AN6552



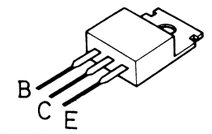
2SA1123, 2SC1685NC
2SC2631, 2SC2632
2SC1845, 2SC1815
2SA1015, 2SC1845
2SA992, 2SC3112
2SD788



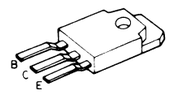
SVDS3V20, SVDSR1K2



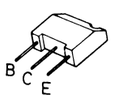
2SC2592R, 2SA1112R



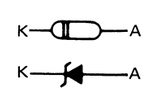
2SC3182, 2SA1265



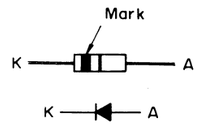
2SD661



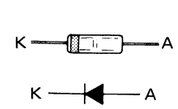
SVDMZ □□□ □



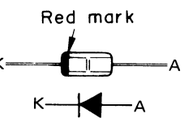
MA162A
Mark



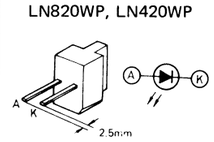
OA90, MA150



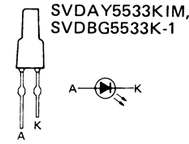
MA27WA
Red mark



LN820WP, LN420WP



SVDAY5533KIM,
SVDBG5533K-1



■ RES

Notes: 1.
2.

Resistor
ERD : Car
ERG : Met

ERD10TLJ

Ref. No.	
RESISTORS	
R71, 72	
R73, 74	
R75, 76	
R77, 78	
R79, 80	
R101, 102	S
R103, 104	S
R105, 106	S
R107, 108	S
R109, 110	S
R111, 112	S
R113, 114	S
R115, 116	S
R117, 118	S
R119, 120	S
R121, 122	S
R203, 204	S
R205, 206	S
R207, 208	S
R209, 210	S
R211, 212	S
R213, 214	S
R215, 216	S
R217, 218	S
R219, 220	S
R221, 222	S
R223, 224	S
R225, 226	S
R227, 228	S
R229, 230	S
R301, 302	S
R303, 304	S
R305, 306⚠	S
R307, 308⚠	S
R309, 310⚠	S
R311, 312⚠	S
R313, 314⚠	S
R315, 316	S
R317, 318⚠	S
R319, 320	S
R321, 322	S
R323, 324⚠	
R325, 326	S
R331	S
R351, 352	S
R353, 354	S
R355, 356	S
R357, 358	S
R359, 360	S
R361, 362	S
R363, 364	S

d at any time with the

s mentioned in the sche-
o. Regarding the part No.
are different from the
cing an order for replace-
eplacement parts list.
ntinental Europe) of this
ject to change depending

the basic circuit diagram
s (EF), (EB), (Ei), (EK),
separate service manual

witch in **"MM"** position.

hono" position.
no ↔ 4. tape 1 ↔ 5. tape 2
witch in "**off**" position.
hono ↔ 4. off ↔ 5. tape
bbing 2 ▶1
osition.
off" position.

osition.

"**main**" position.
note ↔ main and remote
n" position.

240V" position
240V
rcuited.

e special characteristics
y of these components,

ndard values for the DC
with the ground point
exist some errors in the
l impedance of the DC

■ FUNCTION OF TERMINAL (I_{CQ} CONTROLLER IC702)

Pin No.	Mark	Name of block	Description of terminal
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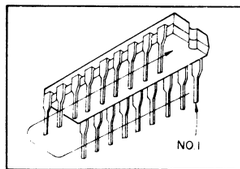
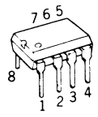
23	DO_0	Output port D	Output terminal for indicator "preheat" and preheating circuit operation. [Output "L"]
24	DO_1		Not used in this unit.
25	DO_2		
26	DO_3		Output relay turns ON with output at "H"
27	V_{DD}	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

• Terminal guide of transistors, diodes and IC's



AN7062	18pin
AN6558F	8pin
SVITD62501P	16pin
MN1421STA	28pin

AN6552



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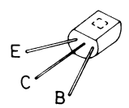
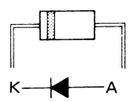
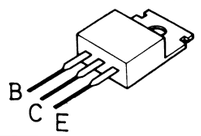
2SC2631, 2SC2632
2SC1845, 2SC1815
2SA1015, 2SC1845
2SA992, 2SC3112
2SD788



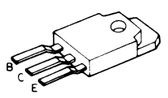
SVDS3V20, SVDSR1K2



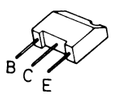
2SC2592R, 2SA1112R



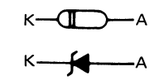
2SC3182, 2SA1265



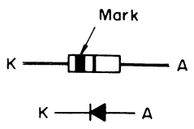
2SD661



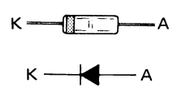
SVDMZ □□□ □



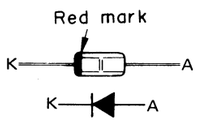
MA162A



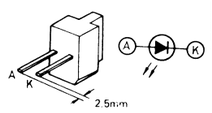
OA90, MA150



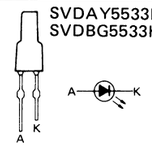
MA27WA



LN820WP, LN420WP



SVDAY5533KIM,
SVDBG5533K-1



■ RESISTORS & CAPACITORS

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The "**S**" mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω(ohm), K = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is μF (microfarad). P = 10^{-6} μF
6. Bracketed indications in Ref. No. columns spedify the area. Parts without these indications can be used for all areas.

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ± 5%
ERG : Metal Oxide	25 : 1/4W	
	1 : 1W	
	2 : 2W	
	3 : 3W	
	S1 : 1/2W	

ERD10TLJ □□□ → Chip type carbon

Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA : Electrolytic	OJ : 6.3V	1H : 50V	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	1C : 16V	D : ± 0.5pF
ECKD : Ceramic	1C : 16V	KC : 400V AC	M : ± 20%
ECQM : Polyester	1E : 25V	1 : 100V	J : ± 5%
ECET : Electrolytic	1H : 50V	45 : 45V DC	K : ± 10%
ECEA..... N: Non Polar Electrolytic	1J : 63V	2H : 500V DC	Z : +80%, −20%
	1V : 35V	2A : 250V AC	N : ± 30%
	50 : 50V		P : +100%, −0%
	25 : 25V		

Ref. No.		Part No.	Value
RESISTORS			
R71, 72		ERD10TLJ334U	330K
R73, 74		ERD10TLJ102U	1K
R75, 76		ERD10TLJ124U	120K
R77, 78		ERD10TLJ103U	10K
R79, 80		ERD10TLJ220U	22
R101, 102	S	ERD25FJ221	220
R103, 104	S	ERD25FJ220	22
R105, 106	S	ERD25TJ224	220K
R107, 108	S	ERD25FJ151	150
R109, 110	S	ERD25TJ473	47K
R111, 112	S	ERD25FJ120	12
R113, 114	S	ERD25FJ151	150
R115, 116	S	ERD25TJ823	82K
R117, 118	S	ERD25FJ682	6.8K
R119, 120	S	ERD25FJ561	560
R121, 122	S	ERD25TJ334	330K
R203, 204	S	ERD25TJ183	18K
R205, 206	S	ERD25TJ473	47K
R207, 208	S	ERD25TJ824	820K
R209, 210	S	ERD25FJ102	1K
R211, 212	S	ERD25FJ271	270
R213, 214	S	ERD25TJ223	22K
R215, 216	S	ERD25TJ104	100K
R217, 218	S	ERD25FJ821	820
R219, 220	S	ERD25TJ153	15K
R221, 222	S	ERD25FJ272	2.7K
R223, 224	S	ERD25TJ153	15K
R225, 226	S	ERD25FJ272	2.7K
R227, 228	S	ERD25TJ394	390K
R229, 230	S	ERD25TJ393	39K
R301, 302	S	ERD25FJ103	10K
R303, 304	S	ERD25FJ471	470
R305, 306 ⚠	S	ERD25FJ120	12
R307, 308 ⚠	S	ERD25FJ272	2.7K
R309, 310 ⚠	S	ERD25FJ821	820
R311, 312 ⚠	S	ERD25FJ470	47
R313, 314 ⚠	S	ERD25FJ122	1.2K
R315, 316	S	ERD25TJ823	82K
R317, 318 ⚠	S	ERD25FJ331	330
R319, 320	S	ERD25TJ154	150K
R321, 322	S	ERD25TJ154	150K
R323, 324 ⚠		ERDS1FJ100	10
R325, 326	S	ERG1ANJ100	10
R331	S	ERD25FJ820	82
R351, 352	S	ERD25FJ332	3.3K
R353, 354	S	ERD25FJ470	47
R355, 356	S	ERD25FJ562	5.6K
R357, 358	S	ERD25TJ334	330K
R359, 360	S	ERD25FJ821	820
R361, 362	S	ERD25FJ682	6.8K
R363, 364	S	ERD25FJ682	6.8K
R365, 366	S	ERD25TJ824	820K
R367, 368	S	ERD25TJ223	22K
R401	S	ERG3ANJ561	560
R402, 403 ⚠	S	ERD25FJ470	47
R404, 405	S	ERD25FJ103	10K
R406 ⚠	S	ERD25FJ821	820
R407	S	ERD25TJ153	15K
R408, 409	S	ERD25FJ821	820
R410	S	ERD25TJ153	15K
R411	S	ERD25TJ104	100K
R412	S	ERD25TJ183	18K
R414	S	ERD25TJ153	15K
R415	S	ERD25TJ473	47K
R416, 417 ⚠	S	ERD25FJ101	100
R418 ⚠		ERDS1FJ332	3.3K
R419	S	ERD25TJ333	33K
R420	S	ERG3ANJ561	560
R501, 502	S	ERG2ANJ331	330
R601	S	ERD25TJ473	47K
R602	S	ERD25TJ333	33K
R603, 604	S	ERD25TJ223	22K
R605, 606	S	ERD25TJ223	22K
R607	S	ERD25TJ223	22K
R608	S	ERD25TJ823	82K
R609	S	ERD25TJ333	33K
R610	S	ERD25TJ184	180K
R611	S	ERD25TJ473	47K
R612, 613	S	ERD25TJ823	82K
R701, 702	S	ERD25FJ331	330
R703, 704	S	ERD25FJ272	2.7K
R705, 706	S	ERD25TJ333	33K
R707, 708	S	ERD25TJ104	100K
R709	S	ERD25TJ104	100K
R710	S	ERD25FJ103	10K
R711	S	ERD25FJ472	4.7K
R712	S	ERD25FJ103	10K
R713	S	ERD25FJ472	4.7K
R715	S	ERD25TJ153	15K
R716	S	ERD25TJ563	56K
R717, 718	S	ERD25TJ333	33K
R719	S	ERD25TJ563	56K
R720	S	ERD25FJ562	5.6K
R721	S	ERD25FJ472	4.7K
R722	S	ERD25FJ103	10K
R723	S	ERD25TJ473	47K
R724	S	ERD25FJ562	5.6K
R725	S	ERD25FJ103	10K
R726	S	ERD25FJ222	2.2K
R728	S	ERD25FJ102	10K
R729	S	ERD25FJ472	4.7K
R730	S	ERD25FJ103	10K
R731	S	ERD25FJ121	120
R733, 734	S	ERD25FJ472	4.7K
R735	S	ERD25FJ822	8.2K
R736	S	ERD25FJ103	10K
R738	S	ERD25FJ822	8.2K
R739	S	ERD25FJ103	10K
R741	S	ERD25TJ153	15K
R742, 743	S	ERD25FJ103	10K
R745, 746	S	ERD25FJ821	820
CAPACITORS			
C1, 2 ⚠		ECKDKC103PF	0.01
C71, 72	S	ECEA50Z3R3	3.3
C73, 74	S	ECCD1H390K	39P
C75, 76	S	ECCD1H820K	82P
C77, 78	S	ECKD1H391KB	390P
C101, 102	S	ECEA50M3R3R	3.3
C103, 104	S	ECEA0JS102	1000
C105, 106	S	ECCD1H101K	100
C107, 108	S	ECQM1H393JZ	0.039
C109, 110	S	ECQM1H122JZ	0.0012
C111, 112	S	ECQM1H103JZ	0.01
C113, 114 ⚠		ECEA1HN010S	1
C201, 202	S	ECKD1H331KB	330P
C203, 204	S	ECQM1H563JZ	0.056
C205, 206	S	ECQM1H223JZ	0.022
C207, 208	S	ECQM1H563JZ	0.056
C209, 210	S	ECKD1H561KB	560P
C211, 212	S	ECCD1H050CC	5P
C213, 214	S	ECEA1CS330	33
C215, 216	S	ECEA1CS330	33
C217, 218	S	ECQM1H183JZ	0.018
C219, 220	S	ECQM1H823JZ	0.082
C221, 222	S	ECCD2H070D	7P
C250	S	ECEA50ZR47	0.47
C301, 302	S	ECEA1HS100	10
C303, 304	S	ECEA50Z1	1
C305, 306	S	ECCD1H560K	56P
C307, 308	S	ECCD1H560K	56P
C309, 310	S	ECKD1H681KB	680P
C311, 312	S	ECKD1H681KB	680P
C313, 314	S	ECKD1H223ZF	0.022
C321, 322	S	ECQM1H473JZ	0.047
C401, 402		ECETS56V822U	8200
C403	S	ECEA1CS222	2200
C404, 405	S	ECEA1JS101	100
C406, 407	S	ECEA1HS100	10
C408, 409	S	ECEA1VS330	33
C410	S	ECEA50Z3R3	3.3
C411	S	ECKD1H223ZF	0.022
C412, 413	S	ECKD1H103ZF	0.01
C414	S	ECKD1H223ZF	0.022
C453	S	ECKD1H103ZF	0.01
C601	S	ECQM1H683JZ	0.068
C602	S	ECKD1H103ZF	0.01
C603	S	ECEA25Z4R7	4.7
C604	S	ECEA50Z1	1
C703, 704	S	ECEA50Z3R3	3.3
C705 ⚠		ECEA1CN101S	100
C706	S	ECCD1H271K	270P
C707	S	ECKD1H223ZF	0.022
C708	S	ECEA1HS100	10
C709	S	ECKD1H223ZF	0.022
C710	S	ECEA1ES101	100
C711	S	ECEA1HS100	10
C712	S	ECKD1H103ZF	0.01
C750	S	ECEA1AS101	100
C752	S	ECEA50Z3R3	3.3
C801, 802 ⚠		ECKDKC222MF	0.0022
C803, 804 ⚠		ECKDKC222MF	0.0022
C805 ⚠ [EF, EH, Ei] only		ECQE2A473MW	0.047

■ REPLACEMENT PARTS LIST

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Ⓚ —marked parts are used for black only, while ○ —marked parts are for silver type only.
4. Part other than Ⓚ — and ○—marked are used for both black and silver type.
5. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
6. The "**S**" mark is service standard parts and may differ from production parts.
7. The parenthesized numbers in the column of description stand for the quantity pre set.

Black type model No. : SU-V505(K)

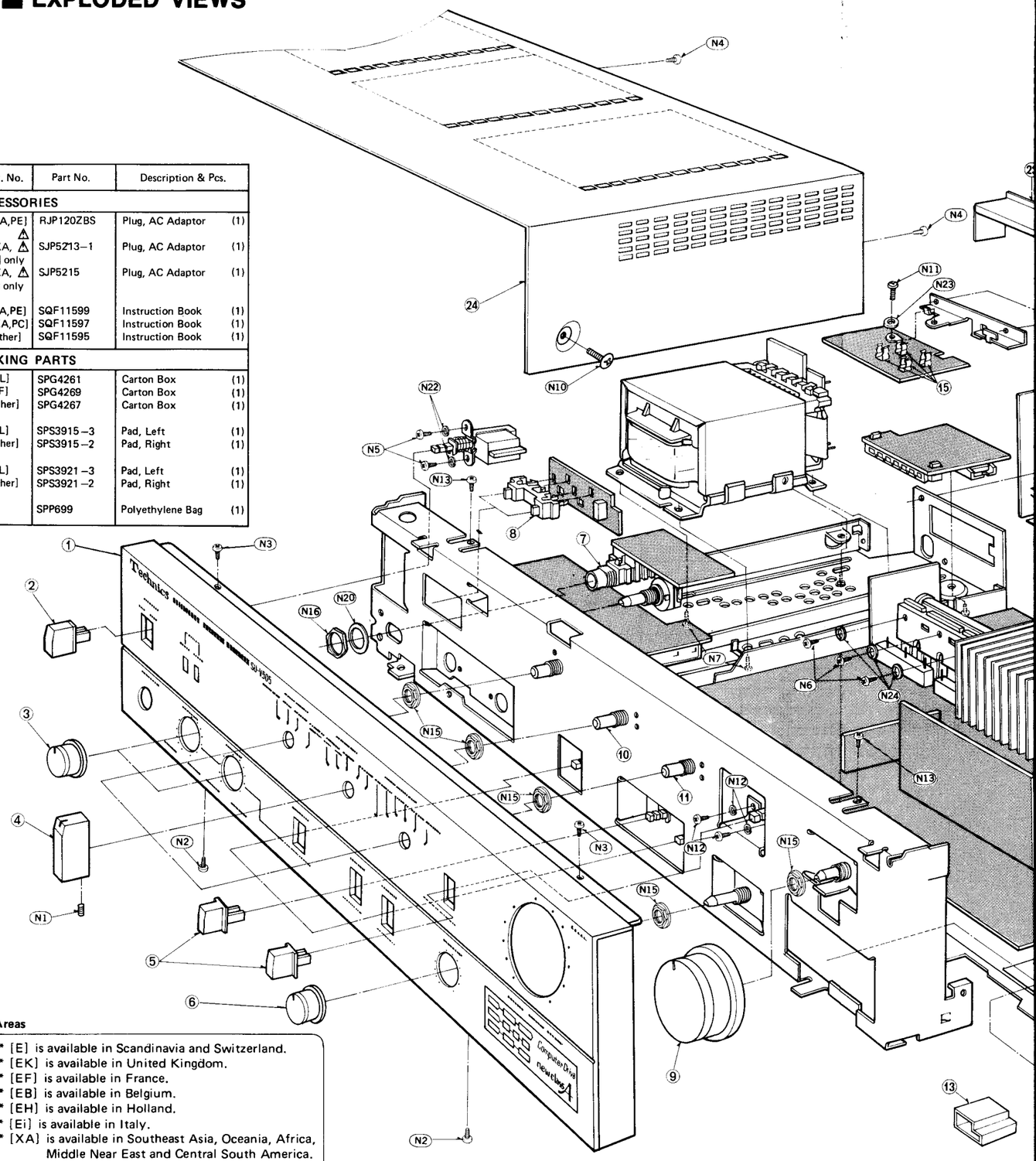
Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC71	AN7062	Voltage Amplifier
IC101	AN6558F	Equalizer
IC301	AN6552F	Voltage Comparator
IC701	SVITD62501P	Inverter
IC702	MN1421STA	Micro Computer (ICQ Control)
TRANSISTORS		
Q71, 72	2SA1123–R	Voltage Amplifer
Q301, 302, S	2SC1685–Q	ICQ Control
Q303, 304	2SC2631–R	ICQ Control
Q305, 306	2SC2631–R	Pre Drive } Use
Q307, 308	2SA1123–R	Pre Drive } pair ranks
Q309, 310	2SC2592–R	Drive } Use pair
Q311, 312	2SA1112–R	Drive } ranks
Q313, 314	2SC3182–R	Power Amplifier } Use pair ranks
Q315, 316	2SA1265–R	Power Amplifier }
Q321	2SC1845	Relay Drive
Q401	2SA1123–R	Regulator
Q402	2SC1815–Y	Regulator
Q403	2SC2632–R	Regulator
Q601, 603, 604	2SA1015–Y	Reset & Detection Signal Generator
Q602	2SC1845	Relay Drive
Q605	2SA992	Relay Drive
Q701, 702	2SC1845	Signal Level Detector
Q703	2SC1815–Y	DC Detector
Q704, 705	2SA1015–Y	DC Detector, Inverter
Q706, 710, 711	2SC3112	Relay Drive, Switching
Q707	2SC3112	Lamp Drive
Q708	2SD788–D	Regulator
Q709	2SD661–S	L.E.D. Drive
Q712, 713	2SA992	ICQ Control
DIODES		
D71, 72	MA162A	Switching
D301~308, 720 S	20A90	Sincro Bias
D309~314	MA27W–A	Bias
D321, 322 S	MA162A	Switching
D331	LN820WP	L.E.D. Output ON (Orange)
D332	LN420WP	L.E.D. Stand-by (Amber)
D401~404 ⚠	SVDS3V40	Rectifier
D405~408 ⚠	SVDSR1K2	Rectifier
D409, 410	SVDMZ318A2	18V, Zener
D411, 412, 414 S	MA162A	Switching
D413	SVDMZ309A	9V, Zener
D601~605	MA162A	Switching
D701~709, 721 S	MA162A	Switching
D711 S	RVDEQA0106S	6V, Zener
D712~717	SVDAY5533K1M	L.E.D. Computer Drive (Yellow)
D718	SVDBG5533K–1	L.E.D. Computer Drive (Green)
FUSES		
F1 ⚠	XBA2C20TR0	250V, T2A
F2 [EK,XA, PA,PE] ⚠	XBA2C40TR0	250V, T4A
F2 [E, EF, EH, EB, Ei, XL] ⚠	XBA2C08TR0	250V, T800mA

Ref. No.	Part No.	Description
COILS		
L301, 302	SLQY15G-30	Choke
TRANSFORMERS		
T1 [other] ⚠	SLT5U27–W	Power Source
T1 [XL] ⚠	SLT5U39–W	Power Source
T1 [EK,XA, PA,PE,PC] ⚠	SLT5N403	Power Source
THERMISTORS		
TH301, 302	ERTD2ZHL103S	10kΩ
TH303, 304	RRT104	100kΩ
VARIABLE RESISTORS		
VR201	EWJG2A066B15	Main, 100kΩ (B)
VR202	EWHFNAF20G15	Balance, 100kΩ (G)
VR203	EWCS7AF20012	Treble,
VR204	EWCS6A020C15	Bass, 100kΩ (C)
VR301, 302	EVNK6AA00B52	ICQ Control, 500Ω (B)
VR303, 304	EVNK6AA00B14	ICQ Control, 10kΩ (B)
VR701 S	EVNM0AA00B14	Clock OSC Control, 10kΩ (B)
LAMPS		
PL701~703	XAMR74S10	12V, 0.055A
SWITCHES		
S1	SSH1079	Phono Selector
S2, 3	ESA2682	Input & Record-ing Selector
S4, 5	SSH2049	Sub Sonic, Loudness
S6	SSH1045	Tone Selector
S7	SSR183	Speaker Selector
S8 ⚠	ESB90227S	Power Source
S9 [EK,XA,PA,⚠ PE,PC] only	ESE37219	Voltage Selector
COMPONENT COMBINATIONS		
Z301, 302 ⚠	ERF3GBKR22N	3W, 0.22Ω (x2)
Z303	SXRPTH517F02	Thermal Detector
Z401 ⚠	SXRFS203ZSM	0.01μF (x2)
Z701	EXBP84103M	10kΩ (x4)
Z702	EXBP84121M	120Ω (x4)
RELAY		
RLY301 ⚠	SSY107	Muting
RLY601 ⚠	SSY109	Voltage Selector

Refer. No.	Part No.	Description & Pcs.
CABINET and CHASSIS PARTS		
1 [other] ○	SYW617	Panel, Front Ass'y (1)
1 ○ [PA,PE]	SYW619	Panel, Front Ass'y (1)
1 Ⓚ	SYW621	Panel, Front Ass'y (1)
2	SBC337-1	Button, Power (1)
3	SBN1153	Knob, Bass, Treble (2)
4	SBN1151	Knob, Speaker, Rec, & Input (3)
5	SBC339	Button, Tone, Subsonic, & Loudness (3)
6	SBN1153	Knob, Balance (1)
7	SJJ71B	Jack, Headphone (1)
8	SMP303	Holder, Output & L.E.D. (1)
9	SBN1149	Knob, Volume & Selector (1)
10	ESA335012B	Switch, Rec. Selector (1)
11	ESA335013B	Switch, Speaker Selector (1)
12	SMP335–1	Holder, New Class A Indicator (1)
13	SDH545	Reflector Plate (1)
14	SHR401–1	Pin (4)
15	SJT347	Terminal, Fuse (2)
16	SKU9950–4	Bottom Board (1)
17	SKL249	Foot (4)
18	SJF4815–2	Terminal, Speaker (1)
19	SJF3051–3N	Terminal, Input (1)
20 [EK]	SGP3590–1C	Panel, Rear (1)
20 [XA,PA, PE,PC]	SGP3590–2A	Panel, Rear (1)
20 [XL]	SGP3590–3A	Panel, Rear (1)
20 [other]	SGP3590–1A	Panel, Rear (1)
21 [PA,PE] ⚠	RJA52YA	Cord, Power Source (1)
21 [EK] ⚠	QFC1205M	Cord, Power Source (1)
21 [XA, PC] ⚠	SJA111	Cord, Power Source (1)
21 [XL] ⚠	QFC1207MA	Cord, Power Source (1)
21 [other] ⚠	SJA88	Cord, Power Source (1)
22 [XL]	SHR131	Bushing, AC Cord (1)
22 [EK]	SHR129	Bushing, AC Cord (1)
22 [other]	SHR127	Bushing, AC Cord (1)
23	SMX745	Insulation Sheet (1)
24 ○	SKC1310S1	Cabinet (1)
24 Ⓚ	SKC1310BB1	Cabinet (1)
25 [XA, ⚠ PA,PE,PC]	SJS601–2	Socket, AC Outlet (1)
26	SMX685	Cover (1)
27	SHR301	Clamper (2)
SCREWS		
N1	XXE4D5FZS	Speaker, Rec, Input Selector (3)
N2 S	XTB3+8BFN	Tapping, ⊕ 3x8 (2)
N3 S	XTB3+8BFN	Tapping, ⊕ 3x8 (2)
N4 S	XTB3+8BFN	Tapping, ⊕ 3x8 (3)
N5 S	XSN3+6S	⊕ 3x6 (2)
N6 S	XTB3+12BFN	Tapping, ⊕ 3x12 (3)
N7 S	XTB4+10BFN	Tapping, ⊕ 4x10 (4)
N8 S	XTN3+8BFN	Tapping, ⊕ 3x8 (4)
N9 S	XTB3+8BFN	Tapping, ⊕ 3x8 (4)
N10 ○	SNE2095–2	Cabinet (2)
N10 Ⓚ	SNE2095–3	Cabinet (2)
N11 S	XTB3+8BFN	Tapping, ⊕ 3x8 (2)
N12 S	XSN3+6S	⊕ 3x6 (2)
N13 S	XTB3+8BFN	Tapping, ⊕ 3x8 (2)
NUTS		
N15	SNE4021	(5)
N16 S	XNS12	φ12 (1)
WASHERES		
N20	SNE59–1	(1)
N21 S	XWA3B	Spring, φ3 (3)
N22 S	XWA3B	Spring, φ3 (2)
N23 S	XWG3	Plain, φ3 (2)
N24 S	XWG3	Plain, φ3 (2)
N25 S	XWG3	Plain, φ3 (2)

Refer. No.	Part No.	Description & Pcs.
ACCESSORIES		
A1 [PA,PE] ⚠	RJP120ZBS	Plug, AC Adaptor (1)
A2 [XA, PC] only ⚠	SJP5213–1	Plug, AC Adaptor (1)
A3 [XA, PC] only ⚠	SJP5215	Plug, AC Adaptor (1)
A4 [PA,PE]	SQF11599	Instruction Book (1)
A4 [XA,PC]	SQF11597	Instruction Book (1)
A4 [other]	SQF11595	Instruction Book (1)
PACKING PARTS		
P1 [XL]	SPG4261	Carton Box (1)
P1 [EF]	SPG4269	Carton Box (1)
P1 [other]	SPG4267	Carton Box (1)
P2 [XL]	SPS3915–3	Pad, Left (1)
P2 [other]	SPS3915–2	Pad, Right (1)
P3 [XL]	SPS3921–3	Pad, Left (1)
P3 [other]	SPS3921–2	Pad, Right (1)
P4	SPP699	Polyethylene Bag (1)

■ EXPLODED VIEWS



Areas

* [E] is available in Scandinavia and Switzerland.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [Ei] is available in Italy.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.
* [PA] is available in Far East PX.
* [PE] is available in European Military.
* [PC] is available in European Audio club.

■ EXPLODED VIEWS

eas.

V505(K)

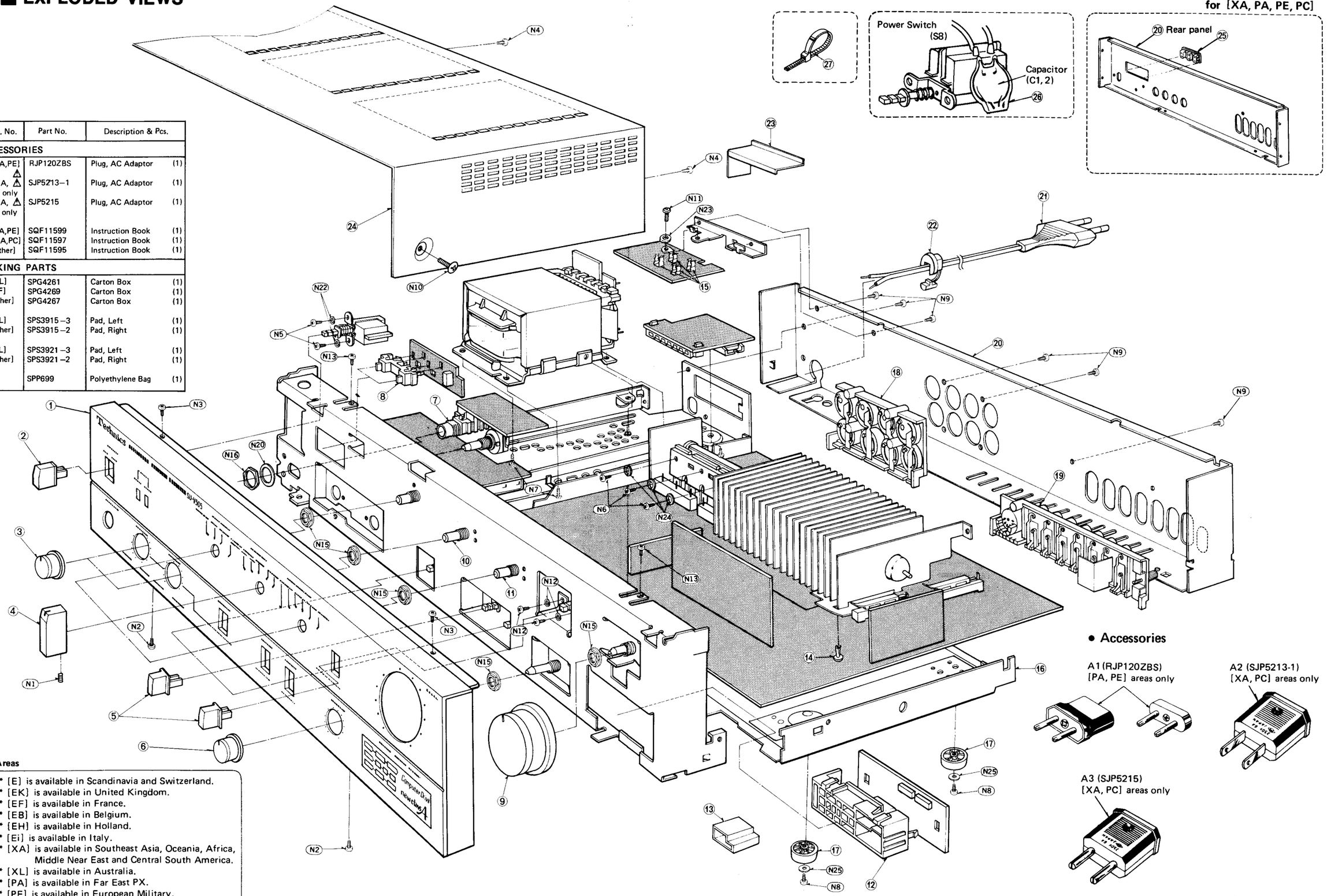
scription & Pcs.	
Volume &	
or	(1)
, Rec. Selector	(1)
, Speaker	
or	(1)
, New Class A	
tor	(1)
tor Plate	(1)
	(4)
nal, Fuse	(2)
n Board	(1)
	(4)
nal, Speaker	(1)
nal, Input	(1)
Rear	(1)
Rear	(1)
Rear	(1)
Rear	(1)
Power Source	(1)
Power Source	(1)
Power Source	(1)
Power Source	(1)
Power Source	(1)
g, AC Cord	(1)
g, AC Cord	(1)
g, AC Cord	(1)
ion Sheet	(1)
t	(1)
t	(1)
, AC Outlet	(1)
	(1)
er	(2)
r, Rec, Input	
or	(3)
g, ⊕ 3x8	(2)
g, ⊕ 3x8	(2)
g, ⊕ 3x8	(3)
6	(2)
g, ⊕ 3x12	(3)
g, ⊕ 4x10	(4)
g, ⊕ 3x8	(4)
g, ⊕ 3x8	(4)
t	(2)
t	(2)
g, ⊕ 3x8	(2)
6	(2)
g, ⊕ 3x8	(2)
	(5)
	(1)
	(1)
φ3	(3)
φ3	(2)
3	(2)
3	(2)
3	(2)

Refer. No.	Part No.	Description & Pcs.	
ACCESSORIES			
A1 [PA,PE]	RJP120ZBS	Plug, AC Adaptor	(1)
A2 [XA, ⚠ PC] only	SJP5213–1	Plug, AC Adaptor	(1)
A3 [XA, ⚠ PC] only	SJP5215	Plug, AC Adaptor	(1)
A4 [PA,PE]	SQF11599	Instruction Book	(1)
A4 [XA,PC]	SQF11597	Instruction Book	(1)
A4 [other]	SQF11595	Instruction Book	(1)
PACKING PARTS			
P1 [XL]	SPG4261	Carton Box	(1)
P1 [EF]	SPG4269	Carton Box	(1)
P1 [other]	SPG4267	Carton Box	(1)
P2 [XL]	SPS3915–3	Pad, Left	(1)
P2 [other]	SPS3915–2	Pad, Right	(1)
P3 [XL]	SPS3921–3	Pad, Left	(1)
P3 [other]	SPS3921–2	Pad, Right	(1)
P4	SPP699	Polyethylene Bag	(1)

Areas

* [E] is available in Scandinavia and Switzerland.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [Ei] is available in Italy.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.
* [PA] is available in Far East PX.
* [PE] is available in European Military.
* [PC] is available in European Audio club.

Rear panel and AC outlet . . . for [XA, PA, PE, PC]



• Accessories

A1 (RJP120ZBS) [PA, PE] areas only

A2 (SJP5213-1) [XA, PC] areas only

A3 (SJP5215) [XA, PC] areas only

Printed in Japan
830111000 ® YK/IM

ORDER NO. SD83012365C9-A

Stereo Integrated Amplifier SU-V505/SU-V505(K)

- This booklet contains the specifications and adjusting procedures for SU-V505, written Germany, French and Spanish, and the circuits to be changed according to areas.
- File this manual together with the SU-V505 service manual (Order No. SD83012365C9).

- Diese Broschüre enthält die technischen Daten und die Beschreibungen der Justiermethoden für SU-V505 in deutscher, französischer und spanisher Sprache, sowie die entsprechend dem Gebiet zu ändernden Schaltungen.
- Bewahren Sie das Büchlein zusammen mit der Bedienungsanleitung für SU-V505 (Betstell-Nr. SD83012365C9) auf.

- Cette brochure contient les spécifications et les procédures de réglage pour le SU-V505, écrites en allemand, en français et en espagnol et explique les circuits devant être modifiés selon les régions.
- Classer ce manuel en même temps qu'avec le manuel de service du SU-V505 (N° d'ordre : SD83012365C9).

- Este librito contiene las especificaciones y procedimientos de ajuste para SU-V505, escritas en alemán, francés y español, y los circuitos a cambiarse según las áreas.
- Guardar este manual juntamente con el manual de servicio de SU-V505 (Pedido N°. SD83012365C9).

DEUTSCH

■ TECHNISCHE DATEN (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz
beide Kanäle ausgesteuert 2 × 60W (4 Ω)
2 × 60W (8 Ω)

Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz
beide Kanäle ausgesteuert 2 × 60W (4 Ω)
2 × 60W (8 Ω)

Dauerton-Ausgangsleistung bei 1 kHz
beide Kanäle ausgesteuert 2 × 60W (4 Ω)
2 × 60W (8 Ω)

Gesamtklirrfaktor
Nennleistung bei 20 Hz ~ 20 kHz 0,03% (4 Ω)
0,004% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz 0,03% (4 Ω)
0,004% (8 Ω)
Nennleistung bei 1 kHz 0,007% (4 Ω)
0,003% (8 Ω)
halbe Nennleistung bei 20 Hz ~ 20 kHz 0,004% (8 Ω)
halbe Nennleistung bei 1 kHz 0,002% (8 Ω)
−26 dB Leistung bei 1 kHz 0,01% (4 Ω)
50 mW Leistung bei 1 kHz 0,01% (4 Ω)

Intermodulationsfaktor
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω 0,03%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω 0,01%

Leistungsbandbreite
beide Kanäle ausgesteuert bei −3 dB
5 Hz ~ 50 kHz (4 Ω, T.H.D. 0,03%)
5 Hz ~ 60 kHz (8 Ω, T.H.D. 0,02%)

Restbrumm und Geräusch 0,6 mV
Dämpfungsfaktor 30 (4 Ω), 60 (8 Ω)

Eingangsempfindlichkeit und -impedanz
Phono - magnetisch (PHONO MM) 2,5 mV/47 kΩ
Phono - dynamisch (PHONO MC) 200 μV/220 Ω
Tuner, Aux/CD/Video 150 mV/22 kΩ
Tape 1 (TAPE 1) 150 mV/22 kΩ
Tape 2 (TAPE 2) 150 mV/22 kΩ

Maximale TA-Eingangsspannung (1 kHz, eff.)
magnetisch (MM) 170 mV
dynamisch (MC) 15 mV

Klangregler
Baßregler (BASS) 50 Hz, +10 dB ~ −10 dB
Höhenregler (TREBLE) 20 kHz, +10 dB ~ −10 dB
Tiefenfilter 30 Hz, −6 dB/Okt.

Geräuschabstand
Nennleistung (4 Ω)
Phono - magnetisch (PHONO MM)
76 dB (83 dB nach IHF, A)
Phono - dynamisch (PHONO MC) (250 μV)
64 dB (65 dB nach IHF, A)
Tuner, Aux/CD/Video, Tape
91 dB (nach IHF, A: 102 dB)
−26 dB Leistung (4 Ω)
Phono - magnetisch (PHONO MM) 71 dB
Phono - dynamisch (PHONO MC) 63 dB
Tuner, Aux/CD/Video, Tape 72 dB
50 mW Leistung (4 Ω)
Phono - magnetisch (PHONO MM) 68 dB
Phono - dynamisch (PHONO MC) 62 dB
Tuner, Aux/CD/Video, Tape 68 dB

Frequenzgang
Phono RIAA-Standardkurve
±0,8 dB (30 Hz~ 15 kHz)
Tuner, Aux/CD/Video, Tape 5 Hz ~ 140 kHz (−3 dB)
+0 dB, −0,2 dB (20 Hz~ 20 kHz)

Gehörrichtige Lautstärkekorrektur (Loudness)
(bei −30 dB Ausgangsleistung) 50 Hz, +9 dB

Ausgangsspannung und -impedanz
Aufnahmeausgang (REC OUT) 150 mV

Kanalabweichung (Aux/CD/Video, 250 Hz ~ 6300 Hz) ±1 dB

Übersprechdämpfung (Aux/CD/Video, 1 kHz) 63 dB

Kopfhörerpegel und -impedanz 520 mV/330 Ω

Lautsprecherimpedanz
MAIN oder REMOTE 4Ω ~ 16 Ω
MAIN und REMOTE 8Ω ~ 16 Ω

■ ALLGEMEINE DATEN

Leistungsaufnahme 370 W

Netzspannung
Für Kontinentaleuropa Wechselstrom 50 Hz/60 Hz, 220V
Für andere Länder Wechselstrom 50Hz/60 Hz, 110V/120V/220V/240V

Abmessungen (B×H×T) 430 × 109 × 290 mm
Gewicht 7,6 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

■ MESSUNGEN UND JUSTIERUNGEN

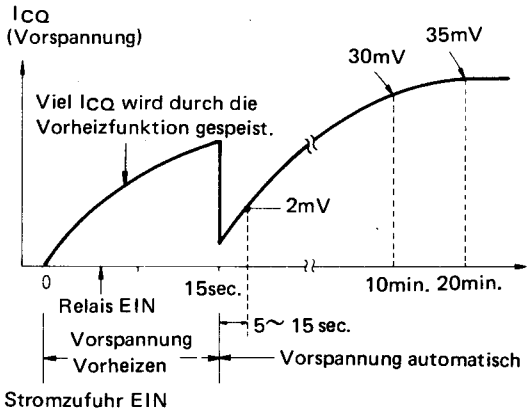
1. Justierung des Taktgebers (nach dem Auswechseln des Mikrocomputers)

(1) Die Stromzufuhr abschalten.
(2) VR701 so abgleichen, daß die Zeit bis zum Einschalten des Relais 5~7 Sekunden vom Einschalten der Stromzufuhr beträgt.
  * Wenn VR701 entgegen dem Uhrzeigersinn (in Richtung A) gedreht wird, verlängert sich die Zeit (Frequenz verringert sich).
  * Wenn VR701 im Uhrzeigersinn (Richtung B) gedreht wird verkürzt sich die Zeit (Frequenz erhöht sich).

(Anmerkung) Die Taktgeberfrequenz von 400kHz wird an TP701 erhalten. Im Falle eines gewöhnlichen Frequenzzählers und Oszilloskops kann die Frequenz aufgrund der Probenkapazität nicht korrekt gemessen werden. Es ist daher empfehlenswert, für die Servicearbeiten die obige Methode anzuwenden.

2. Justierung des Leerlaufs (I_{CQ}) (nach Reparatur des Hauptverstärkers)

(1) Nach der Reparatur ist die Lautstärke auf Minimum einzustellen, bevor der Netzschalter eingeschaltet wird, und es sollte nichts an die Lautsprecheranschlüsse angeschlossen werden.
(2) Den I_{CQ}–Regler (VR301, 302) vollständig entgegen dem Uhrzeigersinn drehen.
(3) Die an den Verstärker angelegte Spannung allmählich mit dem Spannungsregler erhöhen und vor Beginn der Justierung ist der Wert in der nachstehenden Tabelle zu überprüfen.
(4) Das elektronische Gleichstrom–Voltmeter an TP303 (+) und TP305 (–) (linker Kanal) oder TP304 (+) und TP306 (–) (rechter Kanal) anschließen.
(5) Nach Ablauf von 5 oder 15 Sekunden nach Aufleuchten von Computer Drive Monitor "auto", VR301 (linker Kanal) oder VR302 (rechter Kanal) auf 2mV abgleichen.
  * In diesem Gerät wird I_{CQ} durch den Mikrocomputer gesteuert, und I_{CQ} von ein wenig mehr als dem normalen Pegel wird durch "PREHEAT" während 15 Sekunden nach Einschalten der Stromzufuhr gespeist. Nachher werden der Ausgangspegel und die Transistortemperatur durch "AUTO" erfaßt, und dadurch wird I_{CQ} automatisch gesteuert.



3. Justierung der Lastimpedanz–Detektionsschaltung (nach Reparatur der Lautsprecherimpedanz–Detektionsschaltung)

(1) Eine Last von 6,5Ω (1/2W, Kohlewiderstand) oder 3,3Ω und 3,3Ω (1/2W, ±5%) in Serieschaltung an die "main"–Lautsprecheranschlüsse anschließen.
(2) Den Lautsprecher–Wahlschalter in die "main"–Position stellen.
(3) TP601 mit dem Chassis verbinden.
(4) Ein Gleichstrom–Voltmeter zwischen TP301 und dem Chassis (L. Kanal) oder TP302 und Chassis (R. Kanal) anschlie en.
(5) VR301 (L.Kanal) so justieren, daß die Spannung von TP301 –200mV beträgt.

ANMERKUNG
Unbedingt zuerst VR301 (L. Kanal) vor VR302 (R. Kanal) justieren.

* Prüfungen der Schutzschaltung nach Reparatur und Justierung

• Prüfung der Stummschaltung beim Ein– und Ausschalten des Netzschalters

(1) Wechselstrom–Voltmeter und 8Ω–Last (Widerstand oder Lautsprecher an die Haupt–Lautsprecheranschlüsse anschließen.
(2) Die Lautstärke auf einen normalen Pegel einstellen.
(3) Signal von 1kHz, 100mV an den AUX–Eingangsanschluß anlegen.
(4) Überprüfen, daß die Ausgangsleistung 5 Sek. nach Einschalten des Netzschalters erreicht wird, und daß die Ausgangsleistung sofort beim Ausschalten der Stromzufuhr Null wird.

- **Überprüfung der Überlastungs–Detektions– und –Schutzschaltung**
  (1) Ausgangssignal von 1,5V bei 1kHz an den AUX–Eingangsanschluß anlegen.
  (2) Die Hauptlautsprecheranschlüsse (linder Kanal) mit (möglichst kurzem und dickem) Draht kurzschließen; dann überprüfen, daß:
  - das Relais ausgeschaltet ist.
  - die Ausgangsanzeige "on" erlöscht.
  - die Ausgangsanzeige "stand by" blinkt.

  (3) Sicherstellen, daß der Zustand (2) bei geöffneter Ausgangsschaltung erreicht wird. Auf entsprechende Weise ist auch der rechte Kanal zu prüfen.
  * Wenn das Relais ausgeschaltet ist, die Stromzufuhr ausschalten und einige Zeit ausgeschaltet lassen, bevor sie wieder eingeschaltet wird.
  Andernfalls werden die ursprünglichen Zustände nicht wiederhergestellt, auch dann nicht, wenn die Schaltung und die Last normal sind.

FRANÇAIS

■ CARACTERISTIQUES (Sujet à changement sans préavis.)

(DIN 45 500)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 20 Hz~20 kHz,	2 × 60W (4Ω)
les deux canaux en circuit	2 × 60W (8Ω)
Puissance de sortie continue de 40 Hz~16 kHz,	2 × 60W (4Ω)
les deux canaux en circuit	2 × 60W (8Ω)
Puissance de sortie continue à 1 kHz	2 × 60W (4Ω)
les deux canaux en circuit	2 × 60W (8Ω)
Distorsion harmonique totale	
à puissance nominale (20 Hz~20 kHz)	0,03% (4Ω), 0,004% (8Ω)
à puissance nominale (40 Hz~16 kHz)	0,03% (4Ω), 0,004% (8Ω)
à puissance nominale (1 kHz)	0,007% (4Ω), 0,003% (8Ω)
à demi-puissance (20 Hz~20 kHz)	0,004% (8Ω)
à demi-puissance (1 kHz)	0,002% (8Ω)
puissance de −26 dB à 1 kHz	0,01% (4Ω)
puissance de 50 mW à 1 kHz	0,01% (4Ω)
Distorsion d'intermodulation	
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω	0,03%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,01%
Réponse de fréquences	
les deux canaux en circuit, −3 dB	5 Hz~50 kHz (4Ω, T.H.D. 0,03%)
	5 Hz~60 kHz (8Ω, T.H.D. 0,02%)
Bruit et ronflement résiduels	0,6 mV
Coefficient d'amortissement	30 (4Ω), 60 (8Ω)
Sensibilité et impédance d'entrée	
PHONO, AIMANT MOBILE (PHONO MM)	2,5 mV/47kΩ
PHONO, BOBINE MOBILE (PHONO MC)	200 μV/220Ω
SYNTONISATEUR, AUX/CD/VIDEO	150 mV/22kΩ
BANDE 1 (TAPE 1)	150 mV/22kΩ
BANDE 2 (TAPE 2)	150 mV/22kΩ
PHONO (tension d'entrée maximum, 1 kHz RMS)	
AIMANT MOBILE (MM)	170 mV
BOBINE MOBILE (MC)	15 mV
Réponse de fréquence	
PHONO	Courbe nominale RIAA, ±0,8 dB (30 Hz~15 kHz)
SYNTONISATEUR, AUX/CD/VIDEO, BANDE	5 Hz~140 kHz (−3 dB), +0 dB, −0,2 dB (20 Hz~20 kHz)
Réglage de la tonalité	
BASSES (BASS)	50 Hz, +10 dB~ −10 dB
AIGUS (TREBLE)	20 kHz, +10 dB~ −10 dB
Signal/Bruit	
à puissance nominale (4Ω)	
PHONO, AIMANT MOBILE (PHONO MM)	76 dB (83 dB, IHF, A)
PHONO, BOBINE MOBILE (PHONO MC) (250 μV)	64 dB (65 dB, IHF, A)
SYNTONISATEUR, AUX/CD/VIDEO, BANDE	91 dB (IHF, A: 102 dB)
Filtre subsonique	30 Hz, −6 dB/oct.
puissance de −26 dB (4Ω)	
PHONO, AIMANT MOBILE (PHONO MM)	71 dB
PHONO, BOBINE MOBILE (PHONO MC)	63 dB
SYNTONISATEUR, AUX/CD/VIDEO, BANDE (TUNER, AUX/CD/VIDEO, TAPE)	72 dB
puissance de 50 mW (4Ω)	
PHONO, AIMANT MOBILE (PHONO MM)	68 dB
PHONO, BOBINE MOBILE (PHONO MC)	62 dB
SYNTONISATEUR, AUX/CD/VIDEO, BANDE	68 dB
Compensateur physiologique (volume à −30 dB)	50 Hz, +9 dB
Tension de sortie et impédance	
SORTIE ENREGISTREMENT (REC OUT)	150 mV
Equilibrage des canaux, AUX/CD/VIDEO 250 Hz~6 300 Hz	±1 dB
Séparation des canaux, AUX/CD/VIDEO 1 kHz	63 dB
Niveau de sortie des casques et impédance	500 mV/330Ω
Impédance de charge	
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE)	4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE)	8Ω~16Ω

■ DIVERS

Consommation	370W
Alimentation	
Pour l'Europe	CA 50 Hz/60 Hz, 220V
Autres	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (L×H×Pr)	430 × 109 × 290 mm
Poids	7,6 kg

Remarques:

1. On mesure la distorsion harmonique totale au moyen d'un analyseur de spectre digital (Système H.P. 3045).
2. La Société NATIONAL-PANASONIC-FRANCE, importateur du matériel MATSUSHITA-ELECTRIC déclare que cet appareil est conforme aux prescriptions de la directive 76/889/C.E.E. (arrêté 14 Janvier 1980).

■ MESURAGES ET RÉGLAGES

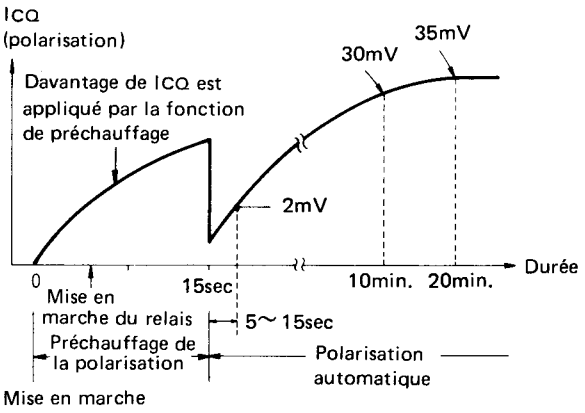
1. Ajustement des impulsions de rythme (après la remise en place du micro-ordinateur)

(1) Mettre hors circuit l'alimentation.
(2) Ajuster VR701 de telle sorte que la durée jusqu'à ce que le relais se mette en circuit soit de 5~7-sec. après la mise en marche.
  * La durée s'allonge avec VR701 tourné dans le sens inverse des aiguilles d'une montre (dans la direction de A). (La fréquence diminue.)
  * La durée raccourcit avec VR701 tourné dans le sens des aiguilles d'une montre (dans la direction de B). (La fréquence augmente.)

(Nota) Une fréquence d'impulsions de rythme de 400 kHz est obtenue à TP701 . Dans le cas d'un oscilloscope et d'un compteur à fréquence normale, la fréquence ne peut être mesurée correctement à cause de la capacité de la sonde. Aussi, il est conseillé d'utiliser la méthode mentionnée cidessus pendant le dépannage.

2. Ajustement de la marche à vide (ICQ) (après réparation de l'amplificateur principal)

(1) Après la réparation, régler le volume sonore au minimum avant la mise en circuit de l'interrupteur d'alimentation, et ne rien raccorder aux bornes des haut-parleurs.
(2) Tourner entièrement dans le sens inverse des aiguilles d'une montre la commande ICQ (VR301 et 302).
(3) Augmenter graduellement la tension appliquée à l'amplificateur à partir de OV au moyen du régulateur de tension, et vérifier la valeur d'après le tableau ci-dessous avant de commencer l'ajustement.
(4) Brancher un voltmètre électronique à C.C. à TP303 (+) et à TP305 (–) (canal de gauche) ou à TP304 (+) et TP306 (–) (canal de droite).
(5) Lorsque 5 ou 15 secondes se sont écoulées après que le contrôleur d'entraînement "auto" de l'ordinateur se soit éclairé, ajuster VR301 (canal de gauche) ou VR302 (canal de droite) sur 2 mV.
  * Dans cet appareil, ICQ est contrôlé par le micro-ordinateur et ICQ, un peu plus que le niveau normal, est appliqué par le "PRECHAUFFAGE" ("Preheat") pendant à peu près 15 secondes après la mise en marche. Après cela, le niveau de sortie et la température du transistor sont détectés par "AUTO", contrôlant automatiquement ainsi ICQ.



3. Ajustement du circuit de détection d'impédance de charge (après réparation du circuit de détection d'impédance des haut-parleurs)

(1) Raccorder une charge de 6,5Ω (1/2W, résistance à couche de carbone) ou 3,3Ω monté en série et 3,3Ω (1/2W, ±5%) aux bornes du haut-parleur principal ("main").
(2) Régler le sélecteur des haut-parleurs sur la position "main" (principale).
(3) Connecter TP601 et el châssis.
(4) Brancher un voltmètre à C.C. entre TP301 et le châssis (canal de gauche) ou TP302 et le châssis (canal de droite).
(5) Ajuster VR301 (canal de gauche) de telle sorte que la tension de TP301 soit de –200mV.
(6) Ajuster VR302 (canal de droite) de telle sorte que la tension de TP302 soit de –200mV.

NOTA
S'assurer d'ajuster VR302 (canal de droite) après l'ajustement de VR301 (canal de gauche).

* Vérifications du circuit de protection après la réparation et l'ajustement

- **Vérification de l'accord silencieux avec l'énergie sur Marche/Arrêt.**

(1) Brancher un voltmètre à C.A. et une charge de 8Ω (résistance ou haut-parleur) aux bornes du haut-parleur principal.
(2) Régler le volume sonore sur un niveau approprié.
(3) Appliquer un signal de 1 kHz 100 mV à la borne d'entrée AUX.
(4) S'assurer que la puissance de sortie est augmentée 5 –sec. après la mise en circuit ("on") de l'interrupteur d'alimentation, et que la sortie s'achève immédiatement après avoir mis l'interrupteur d'alimentation hors circuti ("off").

- **Vérification d'une détection de surcharge et du circuit de protection**
  (1) Appliquer un signal de sortie d'à peu près 1,5V à 1 kHz à la borne d'entrée AUX.
  (2) Avec les bornes du haut-parleur principal (canal de gauche) court-circuitées par un fil d'amenée (aussi épais et court que possible):
  S'assurer que
  - le relais est hors circuit.
  - l'indicateur de sortie "on" (marche) s'éteigne.
  - l'indicateur de sortie "stand by" (attente) clignote.

  (3) S'assurer que la condition de (2) soit obtenue avec le circuit de sortie ouvert. De même, vérifier aussi le canal de droite.
  * Lorsque le relais est hors circuit, tourner l'énergie de l'appareil sur "off" pendant un certain temps avant de remettre en marche ("on").
  Sans quoi, les conditions originales ne seront pas rétablies même lorsque le circuit et la charge sont normaux.

ESPAÑOL

■ ESPECIFICACIONES (Estas especificaciones están sujetas a cualquier cambio sin previo eviso.)

(DIN 45 500)

■ SECCION AMPLIFICADOR

Potencia continua de 20 Hz~20 kHz
en ambos canales 2 × 60W (4Ω)
2 × 60W (8Ω)

Potencia continua de 40 Hz~16 kHz
en ambos canales 2 × 60W (4Ω)
2 × 60W (8Ω)

Potencia continua de 1 kHz
en ambos canales 2 × 60W (4Ω)
2 × 60W (8Ω)

Distorsión armónica total
potencia de régimen a 20 Hz~20 kHz 0,03% (4Ω)
0,004% (8Ω)
potencia de régimen a 40 Hz~16 kHz 0,03% (4Ω)
0,004% (8Ω)
potencia de régimen a 1 kHz 0,007% (4Ω)
0,003% (8Ω)
mitad de potencia a 20 Hz~20 kHz 0,004% (8Ω)
mitad de potencia a 1 kHz 0,002% (8Ω)
−26 dB de potencia a 1 kHz 0,01% (4Ω)
50 mW de potencia a 1 kHz 0,01% (4Ω)

Distorsión por intermodulación
potencia de régimen a 250 Hz: 8 kHz=4:1, 4Ω 0,03%
potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0,01%

Ancho de banda de potencia
con ambos canales, −3 dB
5 Hz~50 kHz (4Ω, T.H.D. 0,03%)
5 Hz~60 kHz (8Ω, T.H.D. 0,02%)

Zumbido residual y ruido 0,6 mV
Factor de amortiguamiento 30 (4Ω), 60 (8Ω)
Sensibilidad e impedancia de entrada
TOCADISC. I. M. (PHONO MM) 2,5 mV/47kΩ
TOCADISC. B. M. (PHONO MC) 200 μV/220Ω
SINTON., AUX./CD/VIDEO (TUNER, AUX/CD/VIDEO) 150 mV/22kΩ
GRAB. 1 (TAPE 1) 150 mV/22kΩ
GRAB. 2 (TAPE 2) 150 mV/22kΩ
Voltaje máximo de entrada de PHONO (1 kHz, RMS)
I. M. (MM) 170 mV
B. M. (MC) 15 mV
Filtro subsónico 30 Hz, −6 dB/oct.
Control de sonoridad (volumen a −30 dB) 50 Hz, +9 dB
Voltaje e impedancia de salida
SAL. GRAB. (REC OUT) 150 mV

Relación de señal a ruido
potencia de régimen (4Ω)
TOCADISC. I. M. (PHONO MM) 76 dB (83 dB, IHF, A)
TOCADISC. B. M. (PHONO MC) (250 μV) 64 dB (65 dB, IHF, A)
SINTON., AUX./CD/VIDEO, GRAB. (TUNER, AUX/CD/VIDEO, TAPE) 91 dB (IHF, A: 102 dB)
−26 dB de potencia (4Ω)
TOCADISC. I. M. (PHONO MM) 71 dB
TOCADISC. B. M. (PHONO MC) 63 dB
SINTON., AUX./CD/VIDEO, GRAB. (TUNER, AUX/CD/VIDEO, TAPE) 72 dB
50 mW de potencia (4Ω)
TOCADISC. I. M. (PHONO MM) 68 dB
TOCADISC. B. M. (PHONO MC) 62 dB
SINTON, AUX./CD/VIDEO, GRAB. (TUNER, AUX/CD/VIDEO, TAPE) 68 dB
Respuesta de frecuencia
TOCADISC. (PHONO) curva RIAA estándar ±0,8 dB (30 Hz~15 kHz)
SINTON., AUX./CD/VIDEO, GRAB. (TUNER, AUX/CD/VIDEO, TAPE) 5 Hz~140 kHz (−3 dB) +0 dB, −0,2 dB (20 Hz~20 kHz)
Controles de tono
BAJOS (BASS) 50 Hz, +10 dB~−10 dB
AGUDOS (TREBLE) 20 kHz, +10 dB~−10 dB
Equilibrio de canales, AUX/CD/VIDEO 250 Hz~6 300Hz ±1 dB
Separación de canales, AUX/CD/VIDEO 1 kHz 63 dB
Impedancia y nivel de salida de los auriculares 520 mV/330Ω
Impedancia de carga
MAIN o REMOTE 4Ω~16Ω
MAIN y REMOTE 8Ω~16Ω

■ GENERAL

Consumo de energía 370W
Alimentación de energía
Para Europa continental CA 50 Hz/60Hz, 220V
Para otros paises CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensiones (An.×Al.×Prof.) 430 × 109 × 290 mm
Peso 7,6 kg

Nota:
La distorsión armónica total se mide con el analizador de espectro digital (sistema H.P. 3045).

■ MEDICIONES Y AJUSTE

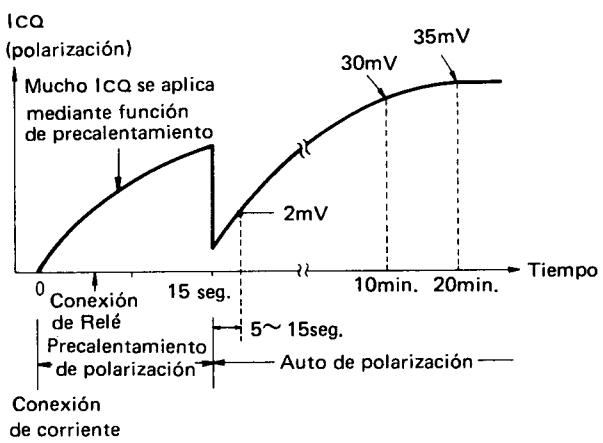
1. Ajuste de Reloj (después de reemplazar el microcomputador)

(1) Desconecte la fuente de alimentación.
(2) Ajuste VR701 de manera que el tiempo, hasta que el relé se conecte, sea 5~7-seg. después de conectarse la corriente.
  * El tiempo se prolonga con VR701 girado a la izquierda (en la dirección de A). (La frecuencia disminuye.)
  * El tiempo se acorta con VR701 girado a la derecha (en la dirección de B). (La frecuencia aumenta.)

(Nota) La frecuencia de reloj de 400 kHz se obtiene en TP701 . En el caso de un contador de frecuencia y osciloscopio ordinarios, la frecuencia no se puede medir correctamente debido a la capacidad de prueba. Por lo tanto, se recomienda emplear el método antes mencionado durante la prestación de servicio.

2. Ajuste de Marcha en Vacìo (ICQ) (después de reparar el amp. principal)

(1) Después de la reparación, ajuste el volumen de sonido al mínimo antes de conectar el interruptor de alimentación, y no conecte nada a los terminales de altavoz.
(2) Gire completamente el control ICQ (VR301, 302) a la izquierda.
(3) Aumente el voltaje aplicado al amplificador gradualmente desde 0V mediante un regulador de voltaje, y asegúrese del valor en la tabla de abajo antes de comenzar el ajuste.
(4) Conecte el voltímetro electrónico de CC a TP303 (+) y TP305 (–) (canal izquierdo) o TP304 (+) y TP306 (–) (canal derecho).
(5) Cuando 5 ó15 segundos han pasado después que el "auto" de monitor de impulsión de computador se enciende, ajuste VR301 (canal izquierdo) o VR302 (canal derecho) a 2mV.
  * En este aparato, ICQ es regulado mediante computador, y ICQ un poco más del nivel normal se aplica mediante "PRECALENTAMIENTO" por unos 15 seg. después de conectarse la corriente. Después de eso, el nivel de salida y la temperatura de transistor se detectan mediatne "AUTO", regulando así automáticamente ICQ.



3. Ajuste de Circuito de Detección de Impedancia de Carga (después de reparar el circuito de detección de impedancia de altavoz)

(1) Conecte una carga con 6,5Ω (resistencia de carbón de 1/2W) o 3,3Ω conectados en serie y 3,3Ω (1/2W, ±5%) a los terminales de altavoz "principal".
(2) Ponga el selector de altavoz en la posición "principal".
(3) Conecte TP601 y chasis.
(4) Conecte un voltímetro de CC entre TP301 y chasis (canal I.) o TP302 y chasis (canal D.)
(5) Ajuste VR301 (canal I.) de manera que el voltaje de TP301 sea –200mV.
(6) Ajuste VR302 (canal D.) de manera que el voltaje de TP302 sea –200mV.

NOTA
Asegúrese de ajustar VR302 (canal D.) después de ajustar VR301 (canal I.)

* Chequeos de Circuito de Protección Después de Reparación y Ajuste

- **Chequeo de Silenciamiento con Conexión/Desconexión de Corriente.**

(1) Conecte voltímetro de CA y carga de 8Ω (resistor o altavoz) a terminales de altavoz principal.
(2) Ajuste el volumen de sonido a un nivel apropiado.
(3) Aplique señal de 1 kHz 100 mV a terminal de entrada AUX.
(4) Asegúrese de que salida ha ganado 5 – seg. después de la conexión de interruptor de alimentación, y que la salida desaparece inmediatamente después de la desconexión del interruptor de alimentación.

- **Chequeo de Detección de Sobrecarga y Circuito de Protección**

(1) Aplique señal de salida de aprox. 1,5V a 1kHz a terminal de entrada AUX.
(2) Con terminales de altavoz principal (canal izquierdo) cortocircuitados mediante alambre de plomo (lo más grueso y corto posible):

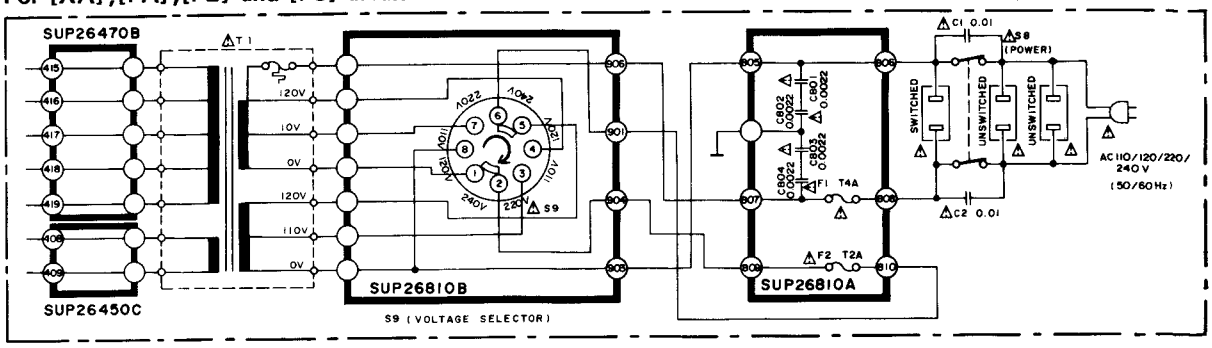
Asegúrese de que
- relé está desconectado.
- indicador de salida "encendido" se apaga.
- indicador de salida "de reserva" parpadea.

(3) Asegúrse de que el estado de (2) ha ganado con circuito de salida abierto. Similarmente, chequee el canal derecho también.
  * Cuando el relé está desconectado, desconecte la corriente y unidad por un tiempo antes de conectarla. De lo contrario, las condiciones originales no se restauran aun cuando el circuito y la carga sean normales.

■ CIRCUITS TO BE CHANGED AND THE AREAS

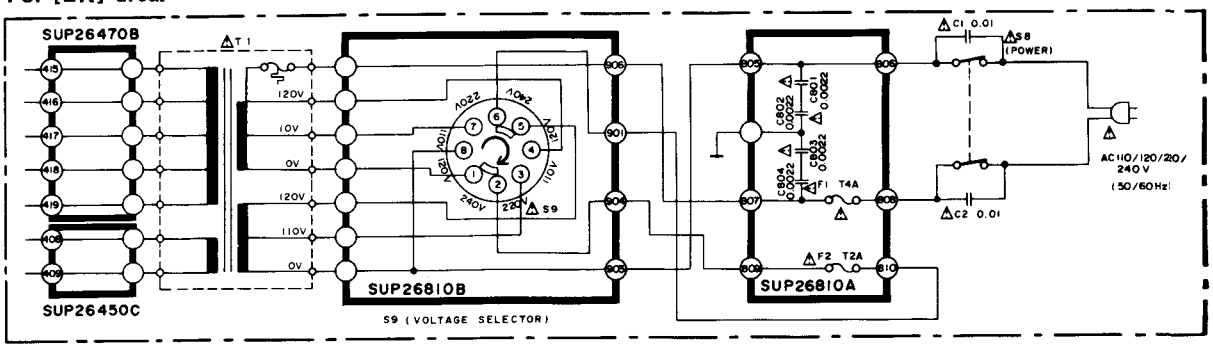
- **Power source circuit**

For [XA],[PA],[PE] and [PC] areas.



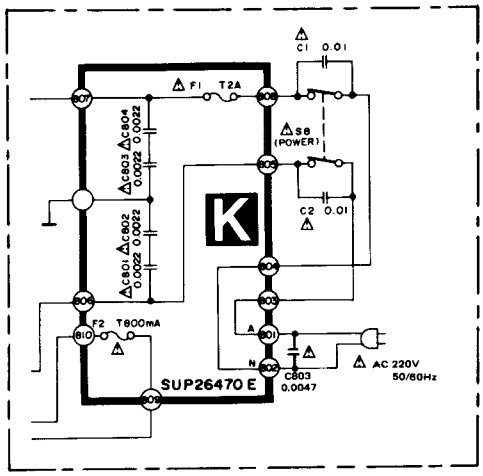
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [PA] is available in Far East PX.
* [PE] is available in European Military.
* [PC] is available in European Audio Club.

For [EK] area.



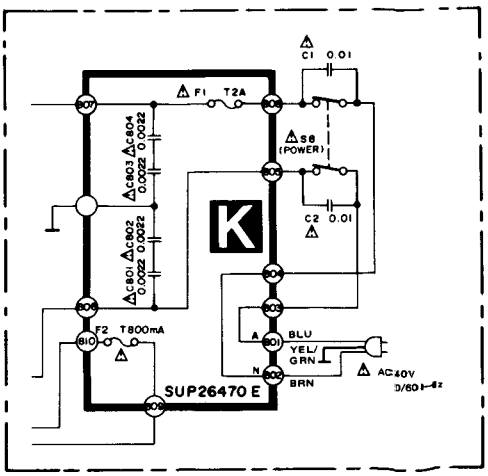
* [EK] is available in United Kingdom.

For [EF],[EH],[Ei] areas.



* [EF] is available in France.
* [EH] is available in Holland.
* [Ei] is available in Italy.

For [XL] area.



* [XL] is available in Australia.